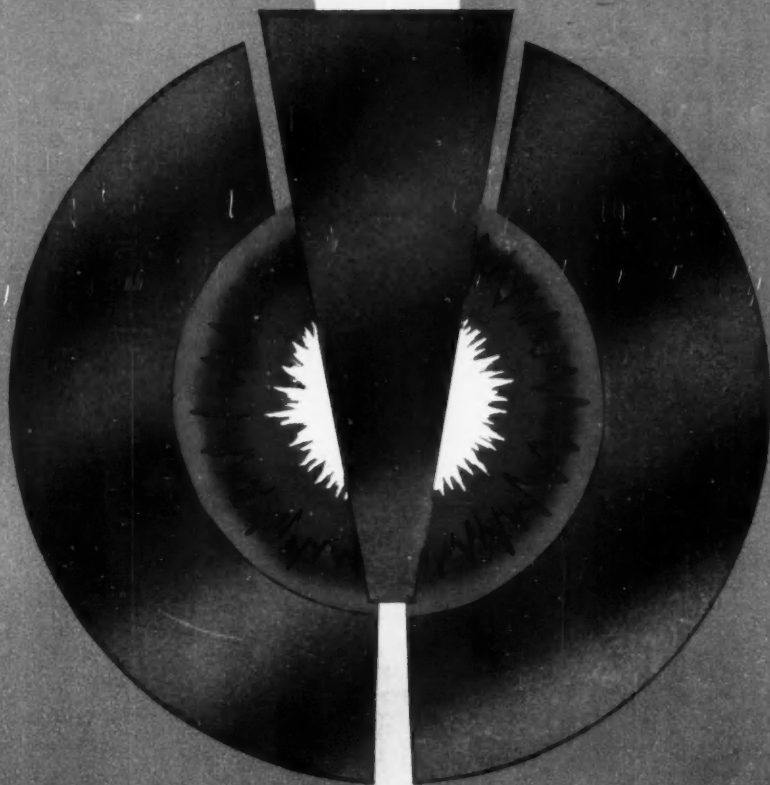


# AUTOMOTIVE INDUSTRIES

MAY 15, 1949



## IN THIS ISSUE

**Motorized Expansion in Canadian Timberlands**

**First Report on Total Engine Production**

**Army to Spend \$83 Million for Vehicles**

**Fuel Spray Nozzles for Aircraft Gas Turbines**

*Complete Table of Contents, Page 3*

A C H I L T O N P U B L I C A T I O N

# What does the **OPERATOR** really think about the **NEW HEALD MACHINES?**



This is one "opinion poll" that leaves no room for doubt. For the scores of actual field reports on new Heald machines in our files all have one thing in common—the enthusiastic endorsement of the operator.

This reaction is not accidental. All of the new Heald machines were designed with the operator's viewpoint in mind. Convenient control grouping—automatic cycles—constant feeds and speeds—improved guarding—convenient working height—easy loading and unloading—these are some of the Heald features that make the operator's job easier...and more productive, too.

Whatever your precision finishing job, there's a time-saving, effort-saving Heald machine that can help you do it faster, easier, and at lower cost. Your nearest Heald representative will be glad to study your requirements and recommend the right machine for the job. Why not get in touch with him today?

Here are a few  
typical answers—  
taken from actual  
field reports on  
Heald installations



**PRECISION INTERNAL AND  
SURFACE GRINDERS**

**PRECISION BORE-MATIC  
FINISHING MACHINES**

**THE HEALD MACHINE COMPANY**

Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit  
Indianapolis • Lansing • New York

How does the operator like the new machine? Very well.

What features appeal to him? Good working height - machine holds size very well.

How does the operator like the new machine?

The operator likes the machine very much.

What features appeal to him? Efficient guarding - convenient control location.

How does the operator like the new machine?

The operator is very pleased with the machine.

What features appeal to him? Good guarding - easy to clean.

How does the operator like the new machine? Good.

What features appeal to him? Ease of operation - he likes the controls.

How does the operator like the new machine? He is very pleased with this equipment.

What features appeal to him? The controls - easy machine to load.

How does the operator like the new machine? Very good.

What features appeal to him? Ease of cleaning; easy access to tools.

How does the operator like the new machine? Very well, and it is not tiresome to work on.

What features appeal to him? easy to clean. Easy. Nice machine.

# The WORLD'S LARGEST MOTO-CRANE



The Lorain MC-820 Moto-Crane has two WAUKESHA Super-Duty DIESELS (Model WAKD) six cyl., 6 1/4 x 6 1/2 in., 1197 cu. in. displ. One engine propels the rubber-tired carrier which transports the unit (weight 65 tons) at 18 m.p.h. The second Waukesha Diesel installed in cab of crane (as shown below) powers revolving turntable, hoist, swing and boom derricking; supplying power to lift loads up to 90,000 lb.

lifts and transports  
up to 45 Tons  
with its two  
**WAUKESHA**  
*Diesel*  
**ENGINES**



when Thew built the first portable crane—also a Waukesha-powered Lorain—its capacity was only 3 1/2 tons. The latest Lorain's ability to lift and transport far heavier loads than any previous portable crane, extends the basic advantages of the moto-crane for handling heavy material in steel mills, steel erection, ship and bridge building, oil fields, logging and many other industries.

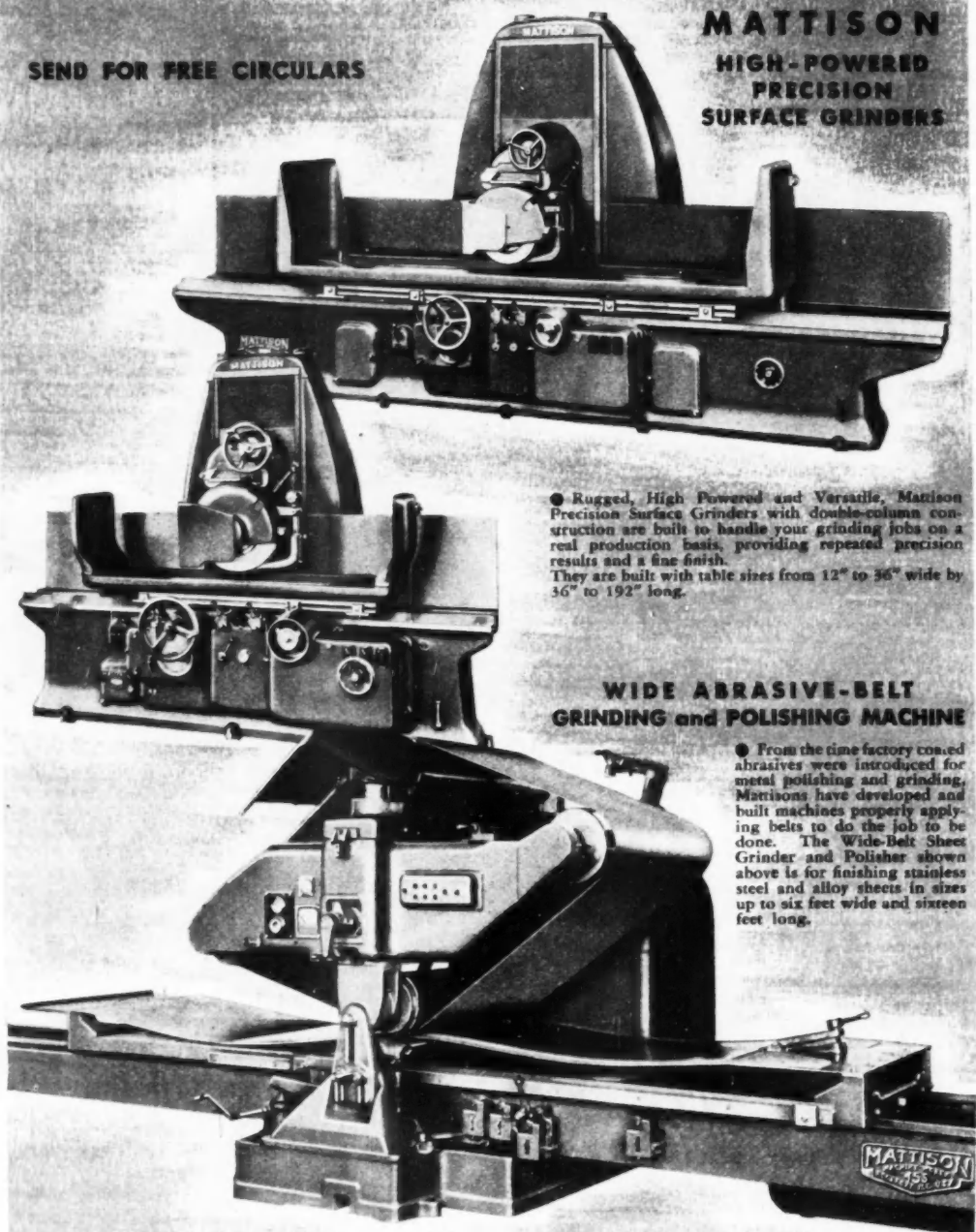
A crane is no better than its engines. With their 30 years of motorized crane experience, Thew Shovel Company engineers chose two big Waukesha Super-Duty Diesels to power the world's largest moto-crane. Waukesha Diesels are winning recognition everywhere as the world's finest power plants of their size and type. Get Bulletin 1415.

**WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.**  
NEW YORK • TULSA • LOS ANGELES

• New fields in heavy material handling by mobile equipment, are being opened by this giant, rubber-tired two-engined crane. Said to be the world's largest, the first of these Waukesha-Diesel-powered Lorain MC-820 Moto-Cranes is working in the world's largest steel mill. It has a safe-rated lifting capacity of 45 tons (90,000 lb.) at a 12-ft. radius. Thirty years ago

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## WIDE ABRASIVE-BELT GRINDING and POLISHING MACHINE

● From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.

# MATTISON

# MACHINE WORKS

ROCKFORD • ILLINOIS

# AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

May 15, 1949

Vol. 100, No. 10

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Many manufacturers find that in Tourek's wide range of standard Ball Joints there is a type and size which meets their exact requirements. You, too, can simplify the design and improve the performance, as well as reduce the cost of your products by specifying standard Tourek Ball Joints... Our large stock assures prompt delivery.

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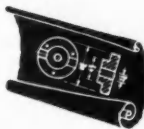


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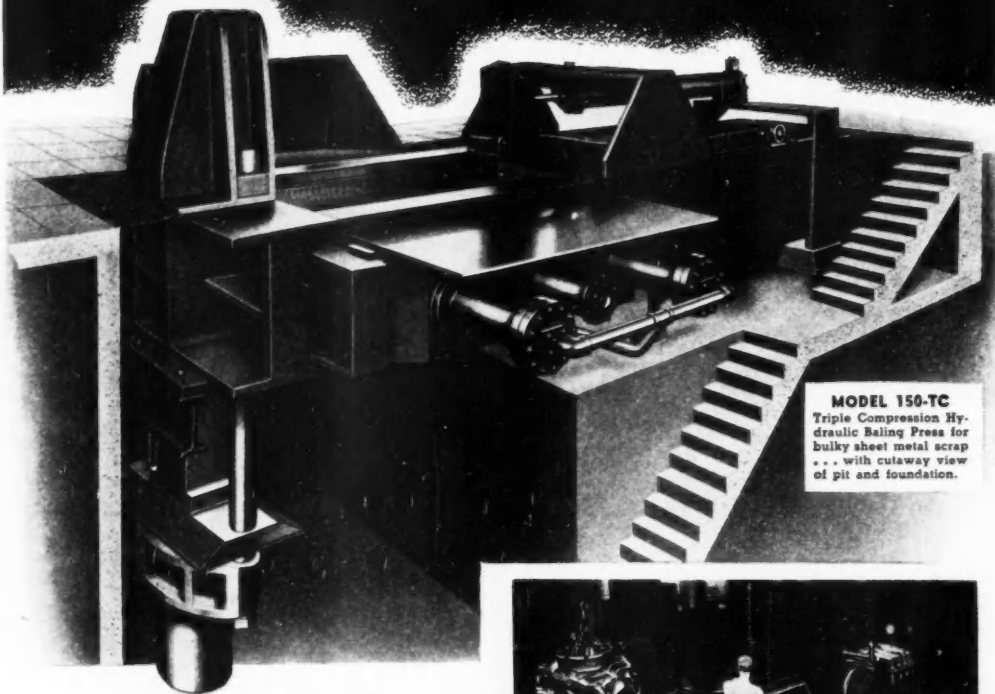


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FAMOUS BALL JOINTS

# Sheet Metal SCRAP MUST Be BALED!

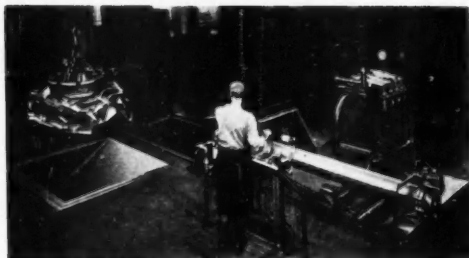


**MODEL 150-TC**  
Triple Compression Hydraulic Baling Press for bulky sheet metal scrap ... with cutaway view of pit and foundation.



Light gauge sheet metal "scrap" ... such as industrial stampings and clippings ... is an increasingly important factor in the

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Operating view of a G-H Triple Compression Baler which has served a large Eastern metal working plant profitably for many years.

erated in sufficient volume. Galland-Henning builds powerful, efficient hydraulic balers in a range of sizes and capacities to meet every industrial need. For Experienced Counsel on Profitable Baling of your Sheet Metal Scrap, write —

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# GALLAND-HENNING

## SCRAP METAL BALING PRESSES

A 5589-1P

AUTOMOTIVE INDUSTRIES, May 15, 1949

ONE OF THE RESOURCES BEHIND A UNIQUE POLICY



## THESE MEN THINK IN TERMS OF MILLIONS

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Here in Muskegon's Tool Engineering Department the never-ending assignment is to find new

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Facilities for tool design and tool engineering are but one of the rich resources, in both plant and personnel, that stand behind Muskegon's *unique policy*.

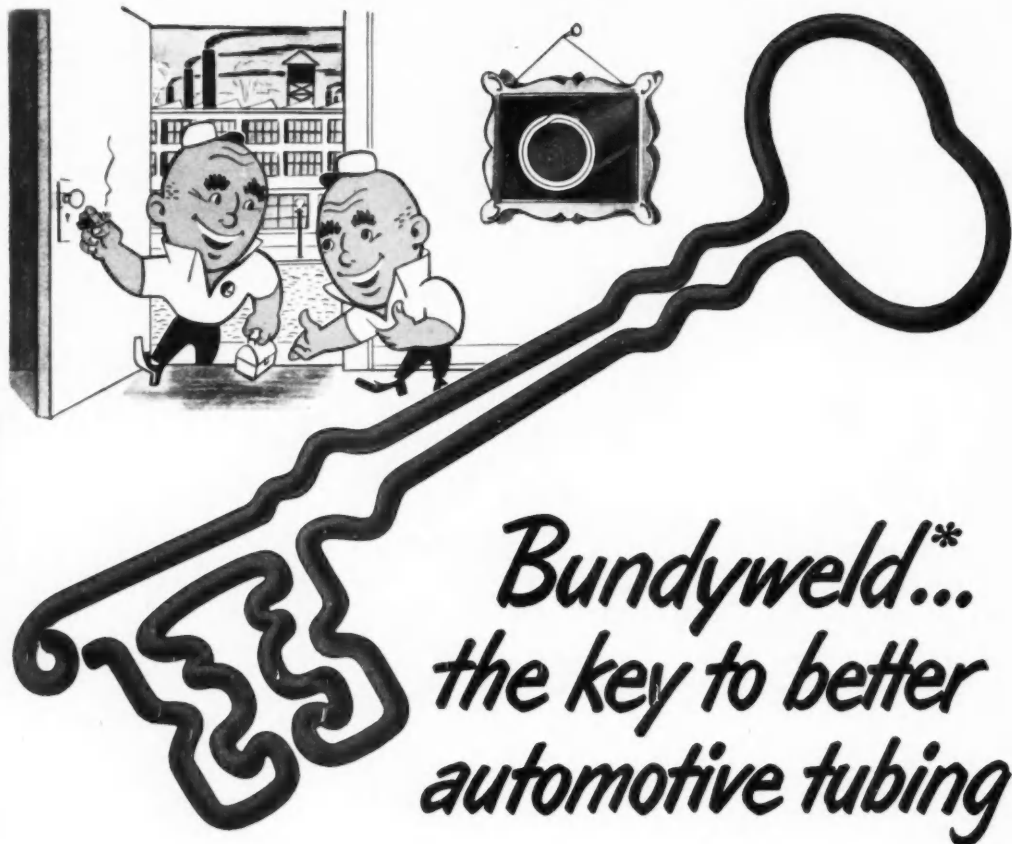
*Policy*

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."



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# Bundyweld... the key to better automotive tubing

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You'll find that 95% of today's cars employ Bundyweld in as many as twenty different parts. Why not check on this low-cost, outstanding tubing for your tubing needs? Contact your near-by Bundy distributor listed below, or write direct to: *Bundy Tubing Company, Detroit 14, Michigan.*

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### WHY BUNDYWELD IS BETTER TUBING

1 Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

2 This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance, cold-rolled strip.


3 Next, a heating process fuses bonding metal to basic metal. Cooled, the double walls have become a strong ductile tube, free from scale, held to close dimensions.

4 Bundyweld comes in standard sizes, up to 3/4" O.D., in steel (copper or tin coated), Monel or nickel. For tubing of other sizes or metals, call or write Bundy.

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BUNDYWELD NICKEL AND MONEL TUBING IS SOLD BY INTERNATIONAL NICKEL COMPANY DISTRIBUTORS IN PRINCIPAL CITIES.



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**HYATT ROLLER BEARINGS**

# ***SUPERFINISH*** *STARTS - OR STOPS - AT SCRATCH!*

Perhaps you've thought of Superfinish only in terms of ultra-smooth surfaces. Not always! Here's one where the process has been stopped—controlled at a surface roughness of 10 micro inches. Note, in this magnification, how the abrasive grits have moved in paths which never duplicate, leaving a crosshatch pattern. For certain applications, such partially Superfinished surfaces have two distinct advantages: (1) removal of the soft "smear metal" left by grinding heat, (2) the cross-hatch pattern maintains uniform distribution of lubricant to discourage spalling.

Superfinish has many other interesting applications. Write on your letterhead for the booklet, "Wear and Surface Finish."

**GISHOLT  
MACHINE COMPANY**  
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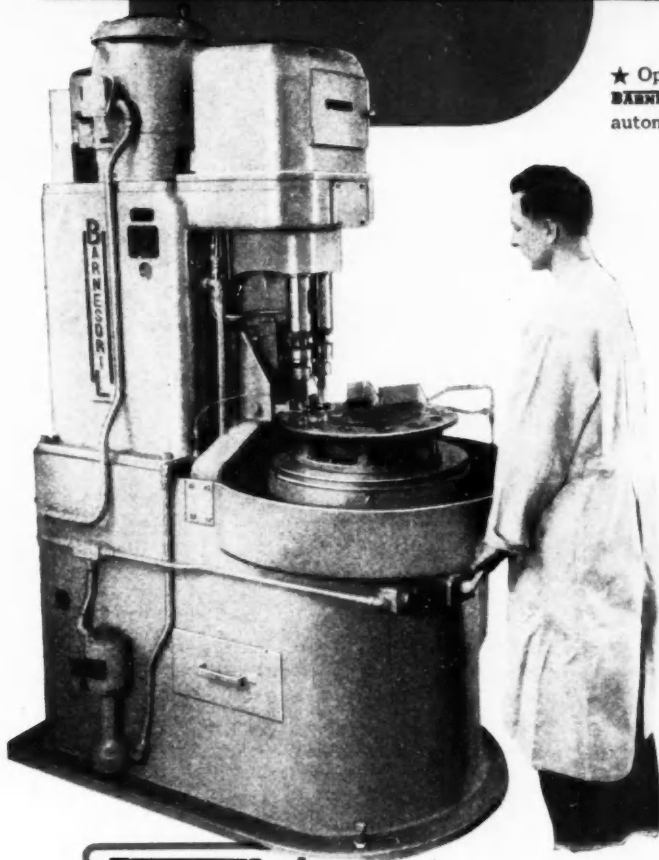
**THE GISHOLT ROUNDTABLE**  
*represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcome here.*

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BARNES DRILL  
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★ Operating at 28 cycles per minute, this **BARNES DRILL** High Production Unit Machine automatically taps and ejects  $\frac{3}{4}$ " threaded

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On similar work, including drilling, reaming or boring as well as tapping, this same automatic cycle can be arranged with automatic loading to further reduce production time. Speed of cycle can be selected to meet even faster production requirements. Why not send us job specifications of parts requiring fast, low cost machining in your shop for production estimates. **BARNES DRILL** representatives will be glad to show you actual savings which can be obtained.

Write for Bulletin B1509.

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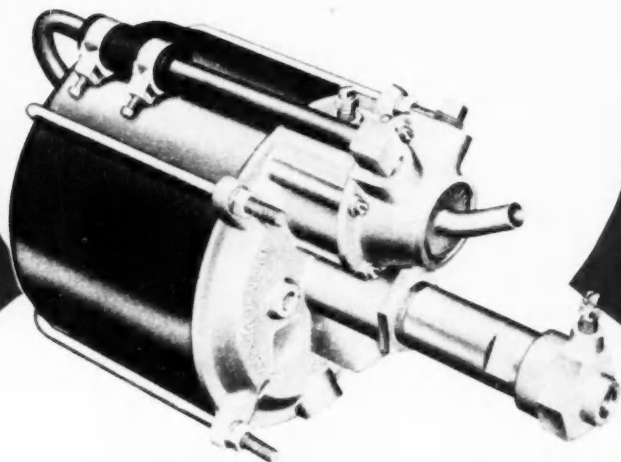
**PRODUCTS**

# ***Bendix Products***

**BUILDERS OF THE BASICS OF**

**BETTER MOTOR VEHICLES**

# **2 MILLION INSTALLATIONS...**



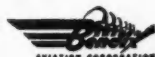
## **HYDROVAC...**

### **the Undisputed Leader in Power Braking!**

By the clear logic of numbers, two million Bendix Hydrovac\* installations lead to certain obvious conclusions: first, that a definite need for power braking is now widely recognized by truck users and manufacturers, and second, that Hydrovac is the power brake most of them prefer. There is much to support the con-

clusion, therefore, that Hydrovac power braking might very profitably be included in the original equipment specifications of most truck manufacturers.

**BENDIX PRODUCTS DIVISION of**  
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Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

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# 325 BLISS-Built Presses at the Murray Corporation of America

**Counsel on right press for job and prompt service are big factors**

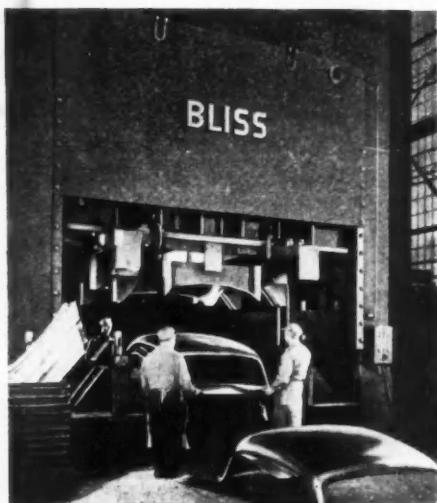
IT'S A FACT! Over 325 Bliss presses of all types and sizes fabricate a diversified line of steel products in the plants of the Murray Corporation of America, one of the largest producers of automotive parts and home appliances.

Fully 75% of the presses in Murray's Detroit plant alone are Bliss-Built! They range from the 40-ton Bliss inclineable press shown blanking parts for a home-appliance unit to the 1400-ton triple-action toggle press which forms the turret tops of low, medium and high priced cars.

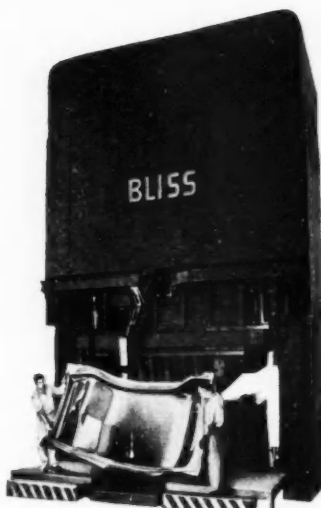
Some of the ways Bliss presses are kept busy in this plant are illustrated in the accompanying photos.

Selection of the right press for the specific job is made only after careful study and recommendations by the Bliss engineering staff, according to Murray's pressroom superintendent. It is this ever-expanding fund of knowledge, over 90 years in the making, that has made Bliss the first choice of stampers the world over. "Ranking next in importance," he says, "is Bliss' prompt service when parts have to be replaced or the presses serviced."

It's another reason why the pressed-metal industry knows that Bliss on a Press Is More Than a Name—It's a Guarantee!...why it pays you to put your press problem up to Bliss.



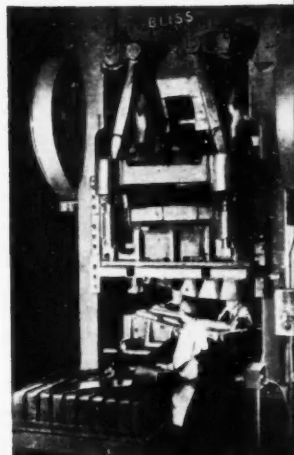
Trimming the turret top in a 650-ton, 4-point enclosed single action press with 160" wide bed. Operation is by electric push-button.



Turret top completely formed with one stroke of Bliss enclosed Toggle Press is shown after being removed from die.



Blanking salvaged scrap steel in No. 21½ Inclineable Press. Die cushion in bed permits shallow drawing.



Deep pillars are drawn in Bliss No. 795½ Toggle Press. "The finest drawing press on the market," said the pressroom superintendent.

1400-ton triple-action enclosed toggle presses form turret tops. Press has four points of pressure on blank-holder slide; is made of stress-relieved steel.

**E. W. BLISS COMPANY**  
**General Offices: Toledo 7, Ohio**

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

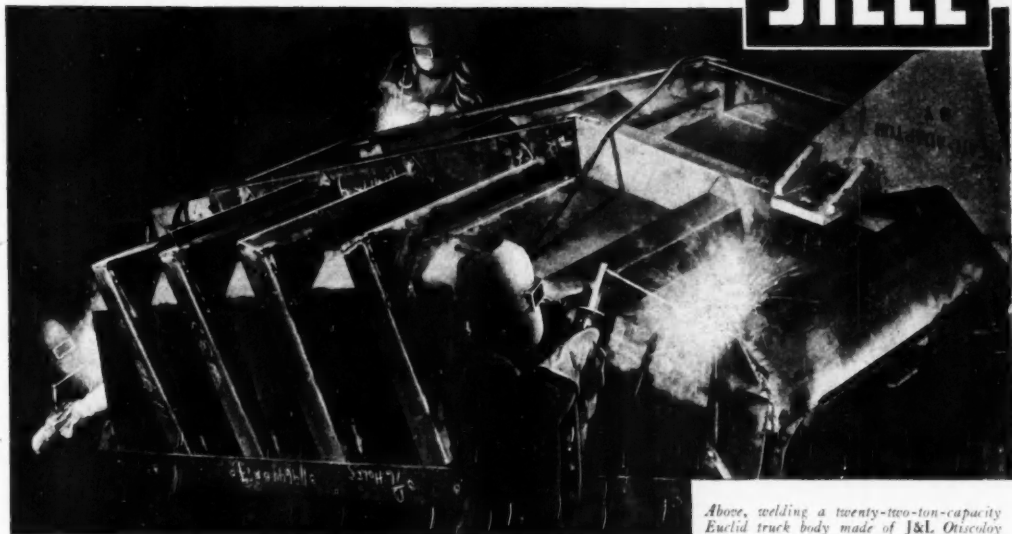
WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France.



**BLISS BUILDS MORE TYPES  
AND SIZES OF PRESSES THAN ANY  
OTHER COMPANY IN THE WORLD**

# Euclid Dump Trucks **HAUL MORE** **AT LOWER COSTS** with body sections of **J&L OTISCOLOY** high-tensile steel

# J&L STEEL



*Above, welding a twenty-two-ton-capacity Euclid truck body made of J&L OtiscoLOY High-Tensile Steel parts.*

## J&L OTISCOLOY in trucks, built for the toughest hauling jobs, pays off for both the manufacturer and truck operator.

The Euclid Road Machinery Company, of Cleveland, Ohio, has six good reasons for building vital parts of bodies for its heavy duty hauling equipment out of J&L OTISCOLOY High-Tensile Steel. These bodies are built to meet today's toughest hauling requirements—at low

operating costs. Every useless pound of dead-weight is designed out of the bodies in order to handle largest possible loads at high speed. Stamina is all-important, because these trucks operate in off-the-road service—in mines, quarries and heavy construction work.

The six reasons why Euclid uses J&L OTISCOLOY are:

1. OTISCOLOY is twice as strong as mild steel.
2. OTISCOLOY has 50% greater fatigue resistance than mild steel.
3. OTISCOLOY has 4 to 6 times greater resistance to atmospheric corrosion than mild steel.
4. OTISCOLOY has substantially greater abrasion resistance than mild steel.
5. OTISCOLOY is easily welded by any of the standard methods.
6. OTISCOLOY can be readily cold formed.

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*From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY and JALLOY (hi-tensile steels).*

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Jones & Laughlin Steel Corporation  
430 Jones & Laughlin Building  
Pittsburgh 19, Pa.

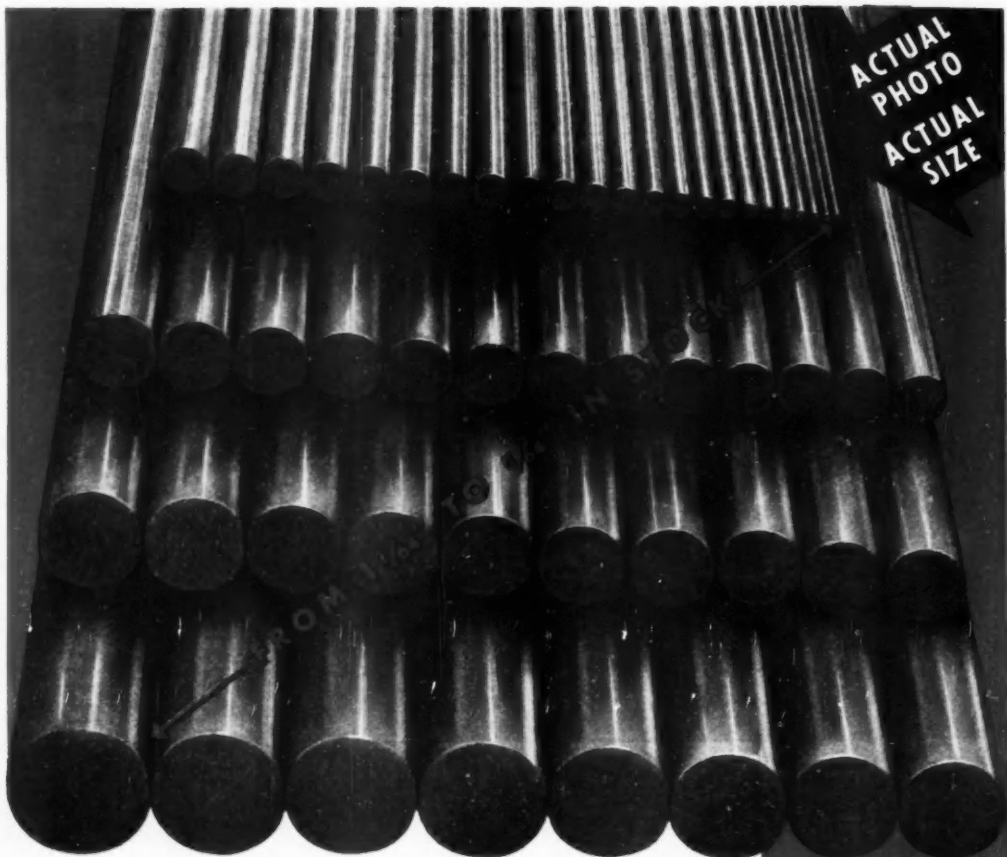
Please send at once a copy of your booklet: "OTISCOLOY High-Tensile Steel."

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TITLE

COMPANY

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**EXAMPLE:** Central Steel has in stock at all times, 64th sizes from 5/64th to 1-1/64th in Cold Finished Steel

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ALLOY  
BRASS  
COPPER  
ALUMINUM**

# **Central Steel**

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NEEDS OF  
THE HOUR**

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 Maintenance Equipment

## High Spots of This Issue

### Motorized Expansion in Canadian Timberlands

The steady northward advance of timber cutting in Quebec and Ontario is calling for expenditures of millions of dollars for tractors, trucks, trailers and other automotive equipment by the major pulpwood interests of Canada. Primary sources of supply are being established farther than ever from rivers, lakes, mills and railheads under huge coincident expansion projects in private industrial highways. The full story, page 25.

### Production of Chris-Craft Outboard Motors

Chris-Craft has entered the outboard motor field with its new Challenger model—a two-cylinder, two-stroke, alternate-firing motor developing 5.5 bhp at 4000 rpm. Many of this motor's major elements are made of aluminum alloy precision die castings, affording some decidedly interesting machining economies. See page 26.

### Fuel Spray Nozzles for Aircraft Gas Turbines

Two experts here discuss and analyze the design and performance of fuel spray nozzles which are among the most critical items in the development of aircraft gas turbines. The article is Part I of a two-part series, beginning on page 30.

### First Report On Total Engine Production

According to Census figures the United States output of engines in 1947 amounted to 8,688,931 units, including 8½ million carburetor engines and 118-879 Diesels. These output figures and others are tabulated and analyzed in the report found on page 34.

### Hot Dimpling Magnesium Sheet

In this account the resistance dimpling method is compared with the conduction heating method as applied to production dimpling of magnesium skins for aircraft. Various photographs and schematic diagrams amplify the points taken up. Turn to page 42.

### 27 New Product Items And Other High Spots, Such As:

Trailer weight reduction of over a half ton with magnesium and aluminum construction; Army spending more than \$83 million for vehicles in the fiscal year '50; knock-free Diesel operation; Ferguson TO-20 tractor engine; unique fuel system on an Indianapolis racer; a magnetometer that indicates the drawing quality of steel; and the three lightweight Diesels Harnischfeger has developed.

News of the Automotive Industries, Page 17  
 For Complete Table of Contents, See Page 3

**AUTOMOTIVE  
 INDUSTRIES**

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# RYERSON STEEL



# NEWS *of the*

## AUTOMOTIVE INDUSTRIES

Vol. 100, No. 10

May 15, 1949

### Packard Cuts Prices on New Models

Packard is the latest company to reduce prices on its cars. Coincident with the introduction of its Golden Anniversary models the first of this month, the company announced price reductions on six of its volume production models ranging from \$103 to \$246. On eight other models, however, prices were increased by \$24 to \$225. In the case of the Custom Eight, the price increase of \$225 is accounted for by the inclusion of an automatic transmission as standard equipment. At the same time, Packard announced that the price of its new automatic drive, called the Ultramatic, has been set at \$225. The transmission will be offered as optional equipment later on other models when production increases to the point where it is available.

### Chrysler First Quarter Net Over \$18.7 Million

The Chrysler Corp.'s consolidated net earnings totaled \$18,707,951 for the first quarter of 1949 as compared with \$14,921,644 for the comparable period last year. Chrysler's sales were \$401,245,547 for the first three months of this year as against \$336,519,790 for the same period a year ago.

### Buick April Output Hits Postwar Peak

Production at GM's Buick Motor Div. hit a new postwar high in April with a total of 35,518 cars. Output of Dynaflo transmissions also hit a new record with the installation of Dynaflo on nearly 26,000 units of the month's car production. So far this year, Buick has produced 93,549 Dynaflo units, compared with 63,798 during all of last year.

### Austin A90 Sets New Records —Drops in Price \$1000

The Austin Motor Co., Ltd. (England), has slashed the price of its Atlantic A90 convertible by \$1000. This is the same model which recently set 63 new records in a seven-day

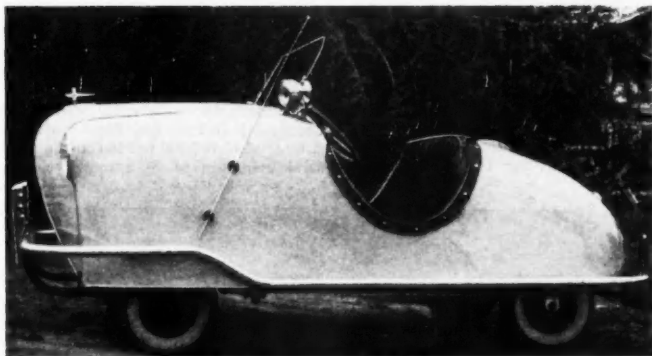
high speed endurance run on the Indianapolis Speedway. The reduction affects both models of the Atlantic: the hydraulically-operated top model which sold formerly for \$3975, and now sells for \$2975; and the manually-operated top unit which formerly sold for \$3795 and now sells for \$2795. Both prices include all Federal taxes paid, delivered in New York fully equipped. The first foreign automobile to hold American stock car records, the A90 covered 11,850 mi at an

### Kaiser-Frazer Names Bedford Executive Vice President

The Kaiser-Frazer Corp. has disclosed that Clay P. Bedford, vice president in charge of manufacturing, has been named executive vice president.

### Labor Trouble Threatens High Production

While April production of passenger cars and trucks was at the highest level



### IMP FROM GLENDALE

The Imp, announced by International Motor Products Co., Glendale, Calif., has a 63-in. wheelbase and is powered by a 7-hp Gladden engine. Weighing 475 lb., the company says that the three-passenger car is priced at about \$600, fob, Glendale.

average speed of 70.54 mph in the speed run.

### GM to Lease Struthers Blast Furnace

GM is going ahead with its plans for leasing a blast furnace from Struthers Iron & Steel Co. at Youngstown, O. Plans had been delayed temporarily by an injunction granted to a minority stockholder, but since withdrawn. Rental price is reported to be \$200,000 a year. Lease of the furnace is understood to be part of an agreement concluded several weeks ago between GM and Pittsburgh Coke & Chemical Co. to supply GM with substantial tonnages of pig iron and foundry and furnace coke for five years. The agreement goes into effect Sept. 1.

since 1929, exceeding March by about three per cent, the outlook for May is extremely unsettled. Just when the industry was starting to realize the full benefits of the greatly improved steel supply, labor unions started to kick over the traces and there have been some serious interruptions to production. A trouble spot has been at the Bendix South Bend, Ind. plant which supplies brakes to a large segment of the industry. The strike was called there over production standards, crippling production at Packard, Kaiser-Frazer, Hudson and Nash and threatening other companies. However, most of the manufactures have now removed their dies from the Bendix plant under court order and are having the brakes built either in their own shops or elsewhere and have been able to get back

# NEWS of the AUTOMOTIVE INDUSTRIES

into production again. At the same time, there have been minor sporadic disturbances at Briggs, Dodge, Midland Steel, and Hudson causing short disturbances on assembly lines. If the current unrest grows worse and spreads, serious curtailment of production will result.

However, as we go to press it is thought that the major issues of speed-up charges, wages, and pensions are to be fought out at Ford Motor Co. The apparent union strategy is to fight out the issues there and then carry any benefits gained into negotiations with the rest of the industry. GM, the largest producer of all, is in the most favorable position regarding labor. Its contract is not open for negotiation this year, and its wage pattern is established under the cost-of-living arrangement whereby hourly rates rise and fall in relation to the BLS Index.

## Studebaker Profit Up in First Quarter

The Studebaker Corp. has reported a net profit of \$5,207,800 for the first quarter of 1949 on total sales of \$113,709,373. Profit for the corresponding

period of 1948 was \$4,251,847, and net sales totaled more than \$91 million. Sales of passenger cars and trucks for the first three months of this year totaled 69,326 units, compared with 58,994 for the same period last year.

## ACF-Brill Elects Perelle President

Charles W. Perelle, formerly head of Gar Wood Industries, Inc., has been elected president of ACF-Brill Motors Corp., succeeding Ronald R. Monroe, who has resigned, but who will remain as a consultant. E. J. Parker, vice president and assistant general manager has also resigned.

## Automotive Makers Again Top Steel Users

Taking 15.4 per cent of total finished steel shipments in 1948, the automotive industry continued in first place among manufacturing consumers, according to preliminary figures recently released by the American Iron and Steel Institute. A total of 10,157,000 net tons of finished steel was shipped to automotive con-

sumers in 1948 as compared with 9,273,000 tons received in 1947.

## Ford Sales Chief Forms Coordinating Staff

J. R. Davis, vice president, sales and advertising, Ford Motor Co., has announced the formation of a staff to assist him in supervising and coordinating all sales and advertising of the company. Ben R. Donaldson, Ford advertising manager since early 1945, has been promoted to director of advertising and sales promotion and will assist in supervising company-wide plans for these activities, and will also be in charge of institutional and special advertising programs. David W. Lee, formerly assistant manager of the truck and fleet sales department, has been promoted to director of sales planning to assist Mr. Davis in developing and supervising company-wide sales plans and policies. Other appointments include those of George J. Crimmins to director of company-wide business management and distribution activities, and of H. D. Everett, Jr., who will continue as director of marketing research on a more extensive company-wide basis.

## GM Sales in First Quarter Highest in History

The largest for any quarter in GM history, net sales of GM products in the first quarter of 1949 amounted to \$1,282,324,474 as compared with \$1,089,151,693 for the same period a year ago. Net income for the first quarter of 1949 totaled \$136,763,338 as against \$96,481,412 for the comparable period last year. Sales of cars and trucks produced by GM plants in the U. S. and Canada during the first quarter of 1949 reached 560,542 units, as contrasted with 536,848 units for the same quarter a year ago.

## Packard Profit Double That of 1948 Period

The net profit of the Packard Motor Car Co. for the first three months of this year is up sharply over the corresponding period of 1948. Earnings during the first quarter were \$3,911,033, compared with \$1,304,727 for the same period of 1948. Total sales for the first quarter of this year amounted to \$59,377,022. Shipments of cars during the first three months of this year were far ahead of the same period last year—30,530 units against 17,904.



## SYMMETRICAL SPORT

Now in production, the new Kurtis sport car, built by Kurtis-Kraft, Inc., Los Angeles, Calif., has a 100-in. wheelbase and weighs 2300 lb. Featuring independent front suspension, semi-elliptic rear suspension, and fiber glass body panels, the new car can be equipped with 82 to 160-hp engines at the buyer's option. Frank Kurtis, president, Kurtis-Kraft, is shown at the wheel together with R. Raymond Kay, Pacific Coast Editor, Automotive Industries.

# NEWS of the AUTOMOTIVE INDUSTRIES

## Meyer and Drake Making New Smaller Racing Engines

Big racing car engines will soon be obsolete, and drastic reduction in engine sizes for Indianapolis racing will surely come about in three or four years, according to Lou Meyer, vice president, Meyer and Drake Engineering Corp., builders of the Offenhauser engine. Anticipating such reduction his company is building a supercharged four-cyl, 122 cu in. engine capable of approximately 300 hp for the 1950 speed classic. It will be installed in a front drive car with a Kurtis-Kraft built chassis, and the estimated weight of the car will be between 1300 and 1400 lb compared with the present 1800 lb average. Mr. Meyer says that the car will do at least 130 mph or he will refund the purchase price. The company is also building an engine for dirt track competition to have its first test June 5 in the 100 mi AAA championship at Milwaukee. It is a supercharged four-cyl, 107 cu in. engine capable of 230 to 240 hp and will do about 125 mph. Its cost is estimated at \$2800 against the current price of \$4600 for the 270 cu in. model. Mr. Meyer told AUTOMOTIVE INDUSTRIES that if their two new engines are successful, the entire racing game, as we know it today, will be revolutionized.

With the official entry list for the 500-mile Indianapolis Race now closed, it has been disclosed that 66 cars have been nominated for the annual classic. The Rocket Special entered by N. J. Rounds has the engine in the rear, while 11 entries have front drives. The Pat Clancy Special features six wheels, and the Thorne Engineering Special, entered by Joe Thorne, is a German Mercedes, purchased from Don Lee, with a six-cyl Thorne engine.

## Hillman Minx Drops Prices from \$97 to \$300

The prices of British Hillman Minx automobiles have been reduced from \$97 to \$300 delivered in New York City. The convertible, formerly sold for \$2196, is now priced at \$1896, and the four-door sedan, which sold for \$1896 is now listed at \$1799.

## Name Shields as Chairman of Curtiss-Wright

Paul W. Shields has been elected to the office of chairman and as chief executive officer of the Curtiss-Wright



Wide World

## CURVY CALIFORNIAN

*Designed and driven by Norman E. Timbs, Van Nuys, Calif., this automobile is 17½ ft long and weighs 2300 lb. Powered by a Buick engine, mounted behind the driver's seat, the car features a rear deck lid which can be raised hydraulically, and an independent rear end suspension.*

Corp. Guy W. Vaughan has retired from the chairmanship. W. C. Jordan, president, has also resigned.

Following the resignation of W. C. Jordan, Robert L. Earle, vice president of Curtiss-Wright and general manager of its propeller division, is now serving temporarily as general manager of the Wright Aeronautical Corp.

## Mooney Says High Taxes Block \$1000 Car

The biggest obstacle to the introduction of a \$1000 automobile is current high tax rates, according to James D. Mooney, board chairman of Willys-Overland Motors, Inc. He told a meeting of the Automobile Old Timers that the average automobile in the mass market class today carries approximately \$450 in direct and indirect taxes. Other obstacles, he said, are unsound government fiscal policies, and a "modern aversion to hard work." He pointed out that last year, industry was able to raise only 19 per cent of its required outside funds from risk capital as proof that heavy corporate and income taxes are drying up industry's sources of new capital. He made another interesting point, stating that despite the remarkable progress the automobile industry has made in the past 20 years, it has not yet been able to equal its 1929 record of production and sales despite the potential market and need for eight million cars and trucks a year in this country. He said that 20 years after reaching the high level

of 1929 we are still thinking in terms of a maximum of five million cars a year.

## MacDonald and Cooper to Spark Crosley Dealer Drive

Powel Crosley, Jr., president, Crosley Motors, Inc., has announced that W. A. MacDonald, formerly vice-president of Kaiser-Frazer, and Fred R. Cooper, formerly K-F vice president in charge of sales, have become associated with Crosley and have also acquired stock interests in the company. Declaring that Mr. MacDonald and Mr. Cooper are preparing plans to greatly expand the company's distributor-dealer organization, which may number 3000 by the end of the year, Mr. Crosley said that their association marks the first step in a program to triple the number of dealers handling Crosley cars.

## GM Doing More of Own Die Work

GM is reported to be doing most of its own die work at the Fisher Body die shop. Normally, GM farms out more than half of its die work, but is now said to be retaining about 90 per cent in its own shops. Principal work there now is on dies for the new "C" body which will be introduced late this year for the Cadillac, Oldsmobile and Buick larger models. A new "B" body will be announced with the Buick Spe-

# NEWS of the AUTOMOTIVE INDUSTRIES

## EGG-SHAPED FOR TRACTION

Tested recently before Army engineers, this scale model (described in AUTOMOTIVE INDUSTRIES, May 1, page 19) with oval-shaped wheels about 16 in. high at their highest point, is shown with John Kopczynski (left), the inventor, and Robert King, both of North Tonawanda, N. Y. It is said that the elliptical wheels give better traction in mud, snow, or soft ground. A compensating device enables the vehicle to ride smoothly.



Acme

cial about Aug. 1, and is also said to be slated for the smaller Cadillac series.

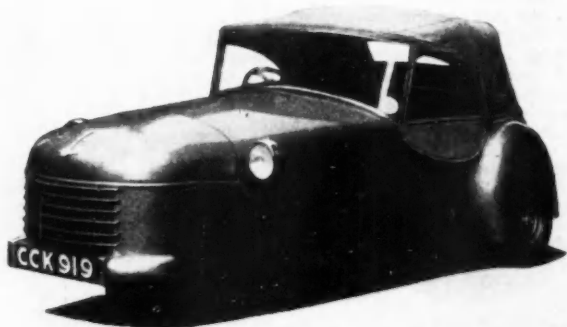
## New Light Three-Wheeled British Car

A lightweight three-wheeler with an air-cooled engine, the Bond automobile, has just been put on the British market at a selling price of \$620. With the exception of such parts as shafts and gears, the car is practically all light-alloy construction and with a wheelbase of 65 in. and a tread of 46 in., weighs 308 lb. Driving and steering through a single front wheel, the car has a Villiers single-cyl two-stroke engine of 7.44 cu in. capacity, driving through a three-speed transmission and chain. It is mounted on a cradle which forms part of and moves with the wheel support. The power unit is so suspended that there is no variation in the centers of the final drive sprockets. The car has no frame and no rear axle. The body is built of sheet aluminum on the stressed-skin principle. The ball bearing-equipped rear wheels are carried on stub axles supported by light alloy castings bolted to the sides of the body. No reverse gear is provided. Engine starting is a modification of the "kick" principle with a lever inside the body. Gasoline consumption is said to be 80 mpg with a maximum speed of 45 mph.

## Borg-Warner Profit Tops \$6 Million

The Borg-Warner Corp. reports earnings for the first three months of 1949 of \$6,692,393. Sales for the period

amounted to more than \$78.7 million, compared with \$77.1 million the same quarter of 1948.



## THREE WHEELED MIDGET

Driving and steering through a single front wheel, the lightweight British Bond automobile, shown above, has a 65-in. wheelbase and weighs 308 lb. The car is said to have a maximum speed of 45 mph. and a gasoline economy of 80 mpg.

## Weiland Resigns As Willys Vice-President

The latest development in organizational staff changes at Willys-Overland Motors, Inc., is the resignation of Arthur J. Weiland as executive vice president. The resignation was announced by James D. Mooney, board chairman. Mr. Weiland will continue as a Willys director. He joined Willys in 1946 as vice president in charge of

distribution and was made executive vice president in May, 1948. Before joining Willys he had been associated with GM since 1924. The Willys board of directors will meet May 19 and is expected to elect a new president and executive vice president.

## American Oil Opens New Lab in Baltimore

The American Oil Co. and its associate, the Pan American Refining Corp., have dedicated a new automotive research laboratory in Baltimore, Md. The plant working area covers 4000 sq ft, and can be expanded to twice its present capacity. The laboratory contains what is reportedly the largest chassis dynamometer in the world.

This dynamometer can absorb 1200 lb-ft of torque at 22 mph roll speed. At 90 mph roll speed, the unit will absorb 350 hp at the rear wheels of the vehicle being tested. The fan will deliver a maximum of 178,000 cfm, absorbing 200 hp. The electrical dynamometer absorbs the additional 150 hp.

Other features of the laboratory include the single-cylinder test room for standard anti-knock determination and basic motor fuel research; the multi-cylinder test room for motor fuel research which does not require a fully-equipped vehicle; and a fleet of fully instrumented test automobiles with overhead valve and L-head engines, manual and automatic transmissions, and high and medium compression engines.

# NEWS of the AUTOMOTIVE INDUSTRIES

## J. W. Frazer to Act As K-F Consultant

Joseph W. Frazer, former president of Kaiser-Frazer who is now vice chairman of the board, will act as consultant to the company on sales and other matters under a three-year contract. According to a proxy statement sent out by Kaiser-Frazer recently, Mr. Frazer will receive \$85,000 for his services the first year, and \$75,000 annually for the second and third years. In the last fiscal year, he received \$90,176 for fees, salaries and commissions.

## Ford Shows Employees Loss from Scrappage

The Ford Motor Co. is taking a direct approach to its quality control program at its Mound Road plant. The company has placed exhibits of scrapped parts throughout the plant with the damaged area identified by red paint and a legend explaining the defect and what caused it. The direct loss in dollars and cents is also plainly set forth. Ford recently held an open house at the plant which it acquired from the government in 1947. The plant, formerly the Naval Ordnance factory, is on a 120-acre site and has 1,127,000 sq ft of factory floor space. Manufacturing operations currently centered there include truck drive shafts; truck and Ford passenger car axle assembly; Ford plant front end linkage assembly; Ford, Lincoln and Mercury oil pan, and Ford flywheel housing. More than 1700 machines are now in operation to process the 300 parts that are manufactured, and more machinery is being prepared for other manufacturing operations soon to be moved there. Current production is 150,000 units and more than 15,000 assemblies a day on three shifts.

## GM Buys WAA Plant for \$1.3 Million

GM's Chevrolet Motor Div. has bought a war surplus general manufacturing plant at Saginaw, Mich., for \$1.3 million from the WAA.

## Delivery at Factory Resumed by Buick

For the first time since the war, Buick has resumed factory delivery for new car customers. According to Ivan L. Wiles, Buick general manager, such deliveries for the present will be available only on a limited basis with preference going to buyers from the West Coast and other distant points. Eventually the factory will be equipped to

handle the delivery of 100 cars a day. Complete and modern car servicing facilities have been installed, together with a comfortable lounge for the customer's waiting room.

## Ask Hudson Stockholders to Vote Share Increase

The Hudson Motor Car Co. stockholders will vote May 20 on a proposal to increase authorized capital stock from two million shares to three million and to establish par value to \$12.50 a share. Currently the stock bears no par value, but is carried on the Hudson balance sheet at \$12.50 valuation. At present 1,823,633 Hudson shares are outstanding of the two million authorized.

## Goodrich Making Tubeless Tires at Two Plants

Volume production of B. F. Goodrich Co.'s new puncture-sealing tubeless tire has been started at the company's Tuscaloosa, Ala., and Miami, Okla., plants.

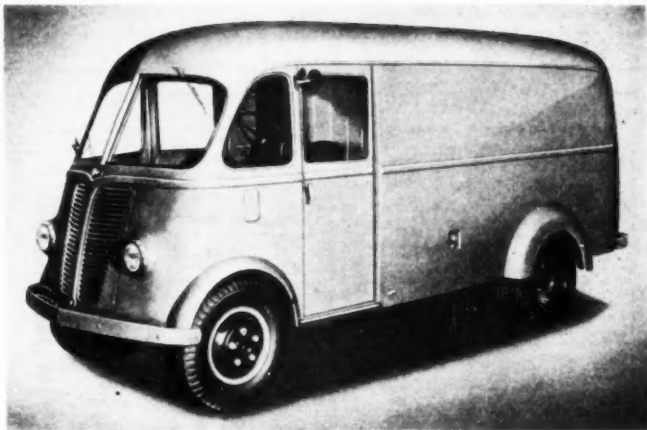
## Ford of Canada Exports Fall Behind Last Year

Effects of import quota restrictions in export markets will be felt more keenly by Ford Motor Co. Lt. of Canada this year than last year, according to Douglas B. Greig, president. He

informed stockholders recently that total export shipments of the company may not exceed 15 per cent of the total sales income, as compared with 27.4 per cent in 1948, and an average of 43.5 per cent during the 1935-1939 period. As a result, he said, the number of cars and trucks available to the Canadian market this year will be materially increased. During the first quarter of this year, the company's share of the Canadian market was the highest of any previous first quarter in history, totaling nearly 64,000 vehicles, more than twice as high as the 1935-1939 average. Home market sales represented 64.7 per cent of the total.

## Int'l's Metropolitan Body Announces New Models

At its 40th anniversary luncheon recently, the Metropolitan Body Co., Bridgeport, Conn., wholly-owned subsidiary of the International Harvester Co., announced new 12-ft Metro bodies on 135-in. wheelbase KB-5-M International truck chassis, new Metro school and passenger buses, new International multi-stop chassis with Metro front-end sections for special bodies, and a new refrigerated truck especially adapted to the delivery of frozen foods. As a result of last year's \$500,000 modernization and expansion program, Metropolitan Body's 1948 production exceeded by 40 per cent its combined production from 1937 to 1941, inclusive.



## THIRD IN LINE

Providing 360 cu ft payload space and rated at 12,000 lb GVW, this new International Model KB-5-M, the third in the Metro truck line, has a 135-in. wheelbase chassis. It is powered by a six-cyl. 93-hp International engine.



# NEWS of the AUTOMOTIVE INDUSTRIES



## TRAINING WITH A BUBBLE

Featuring a bubble canopy for unobstructed vision, this all-metal Fairchild T-31 trainer is to be used for both primary and basic flight training by the USAF. Controls and instruments have been standardized to match the arrangement in combat planes.

## Canadair and Northrop Complete License Agreement

A license agreement, between Canadair, Ltd., Montreal and Northrop Aircraft, Inc., of Hawthorne, Calif., for the production by Canadair of the three-engine Northrop designed "Raider" aircraft, has been announced by H. Oliver West, Canadair president.

## Elect Houser and Reis Directors of K-F

Theodore V. Houser, vice-president in charge of merchandising for Sears, Roebuck & Co., and J. F. Reis, vice-president in charge of finance of Kaiser-Frazer, have both been elected directors of the Kaiser-Frazer Corp.

## British Have New Vehicle Proving Ground

British motor vehicle manufacturers now possess a proving ground located 95 miles from London, eight miles from Coventry and 22 miles from Birmingham, situated in the heart of the manufacturing industry. A former military airport, it comes under the direct control of the Motor Industry Research Association, which has its laboratory on the western edge of London. Although it has been officially inaugurated, much remains to be done to fit the proving ground for its intended purpose. It is roughly triangular in

shape, with the main straightaway one mile in length, another side of the triangle three-quarters of a mile long, and the third side, which has an easy bend in it, over a mile long. Within the main triangle there are three other smaller triangles. It is intended to fit the proving ground for all classes of testing, and it will act in conjunction with the M.I.R.A. laboratory near London. The association responsible for the laboratory and the track is very strongly supported by the British So-

ciety of Motor Manufacturers and Traders. Up to the present the British industry has had no adequate means of conducting tests, with the consequence that cars were often taken over to the French track, or tests were carried out on Continental highways.

## Pingle Resigns as Reo Advertising Chief

John S. Pingle has resigned as head of advertising and public relations for Reo Motors, Inc. He is now in training as a fleet sales representative for Chrysler Corp.'s Fargo Div. He has been succeeded at Reo by Doyle Lott, formerly his assistant.

## See General Business Level Continuing in 1949

Despite declining demand for some lines of goods, business generally expects to see but little decrease in dollar volume of sales during 1949 over 1948, according to a survey conducted by the Office of Business Economics. Moreover, industry and business are making no changes in plans to spend more than \$18 billion this year for plants, stores, equipment, etc. This would represent about five per cent less than last year's \$19 billion plus. As a result of continued business expansion, public utilities represents about the only segment of industry expecting increased sales volume. This is estimated at four per cent over last year. It is significant, however, that the general optimism is less noticeable among the smaller (Turn to page 80, please)

## NEW PASSENGER CAR REGISTRATIONS\*

Arranged by Makes in Descending Order According to the Two Months', 1949 Totals.

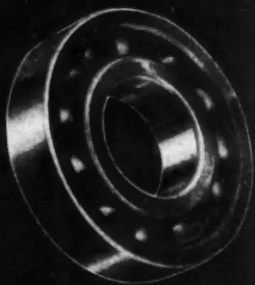
MAKE	TWO MONTHS							
	Units				Per Cent of Total			
	February 1949	January 1949	February 1948	January 1948	February 1949	January 1949	February 1948	January 1948
Ford.....	52,782	55,181	42,650	107,973	87,546	20.32	18.60	
Chevrolet.....	41,275	30,172	53,411	71,447	100,501	13.45	20.08	
Plymouth.....	22,092	35,488	21,433	58,177	51,744	10.95	9.88	
Buick.....	25,136	25,837	20,001	50,973	38,074	9.91	7.28	
Dodge.....	12,496	19,381	14,480	33,277	34,615	8.28	6.53	
Oldsmobile.....	15,924	13,896	12,484	29,820	24,632	5.61	4.08	
Pontiac.....	14,480	12,719	18,148	27,199	34,576	5.12	6.89	
Hudson.....	10,146	11,137	6,907	21,253	13,902	4.00	2.57	
Suabach.....	10,613	9,252	10,307	19,845	20,579	3.75	3.82	
Mercury.....	9,259	9,271	9,321	18,530	19,431	3.49	3.70	
Nash.....	8,124	7,837	8,227	16,061	16,096	3.02	3.18	
Chrysler.....	6,887	9,092	6,188	15,969	14,609	2.91	2.82	
De Soto.....	5,548	7,675	4,710	12,001	7,701	2.26	1.22	
Packard.....	5,879	6,122	3,549	11,817	6,152	2.22	1.17	
Cadillac.....	5,509	6,306	1,801	6,340	2,866	1.19	.57	
Lincoln.....	2,733	3,807	1,236	6,891	12,911	1.11	2.68	
Kaiser.....	2,537	3,354	6,861	3,899	9,986	.70	1.81	
Frazer.....	1,556	2,143	4,585	3,328	3,731	.63	.71	
Willis.....	1,582	1,778	1,401	2,038	2,650	.59	.84	
Crosley.....	672	1,068	1,401	1,013	.....	.....	.....	
British Ford.....	458	585	.....	416	696	.08	.13	
Austin.....	204	212	467	938	194	.16	.05	
All Others.....	445	493	107	.....	.....	.....	.....	
Total.....	258,216	273,169	249,781	531,379	524,759	100.00	100.00	

\*—Data from R. L. Polk & Co.



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PHOTO COURTESY GILFELMAN

# Motorized Expansion

## Underway in Canadian Timberlands on a Big Scale

By Harry Chapin Plummer

THE expenditure of millions of dollars for tractors, trucks, trailers and other automotive equipment and of many more millions for the construction of private industrial highways north of the Laurentian Divide in Quebec and Ontario, Canada, by the major pulpwood interests of Canada, was disclosed at the recent annual convention of the Woodlands Section of the Canadian Pulp and Paper Association in Montreal. Those developments were highlighted in an earlier regional meeting held at Sanmaur, Quebec, a vital center of operations on the Wabano River. Delegates to both assemblages learned of the revolutionary steps being taken to meet the steady northward advance of timber cutting in the two Provinces, thus establishing primary sources of supply farther and farther away from riverside, lake-ice "dumps," mills, and railheads, which form the gateway to the great markets of southern Canada and the United States.

The Laurentian Mountains, more a system than a range, extend from east to west across the twin Provinces. They serve somewhat the same drainage functions for the industrial sectors of Canada that the northeast



*Drift loader is tossing 12-ft loads of pulpwood onto a semi-trailer.*

to southwest Appalachians do for the two highly industrialized areas of the Atlantic watershed, on the one hand, and Ohio, West Virginia, Kentucky, Tennessee and other states, on the other.

Until the mid-30's, the timber areas of the southern (Turn to page 85, please)



*Equipped with a winch and used to transport pulpwood on a sloop, the Snowmobile shown here has, in addition, passenger accommodations for 14.*



*Traveling at 30 mph this tractor, semi-trailer and trailer are hauling a 25-cord load of pulpwood.*

**C**HRS-CRAFT, a name long known in marine circles, has entered the outboard motor field with its Challenger model — a two-cylinder, two-stroke, alternate-firing motor developing 5.5 bhp at 4000 rpm, which is built in a newly-erected plant in Grand Rapids, Mich.

Many of the major elements of the motor are made of aluminum alloy precision die castings. By careful attention to part design and the design of molds they have achieved adequate strength coupled with extreme lightness, and at the same time have taken advantage of the savings in machining made possible by modern die-casting methods. This is evident in machining economy throughout.

Attention is drawn to an uncommon feature—the one piece gear case which extends from the swivel bracket to the propeller. This provides a single strong housing with assurance of alignment of drive shaft, bearings, propeller drive, etc. At the same time it is possible to maintain precise alignment with the axis of the power head. As might be expected this part, a rather intricate casting, required considerable experimentation before the desired result was achieved.

The casting is made of aluminum alloy, heat treated before machining. Major machining steps are done in a special Ex-Cell-O precision boring machine, illustrated here, fitted with two heads installed at right angles. This assures coaxial boring through the vertical section, facing and piloting at both ends, and an exact right angle relationship with the propeller shaft drive. The long vertical bore, about four in. long, for the drive shaft bearing is drilled with a single point gun drill in a single spindle drill set-up, using the upper precision-bored pilot for locating. It is an

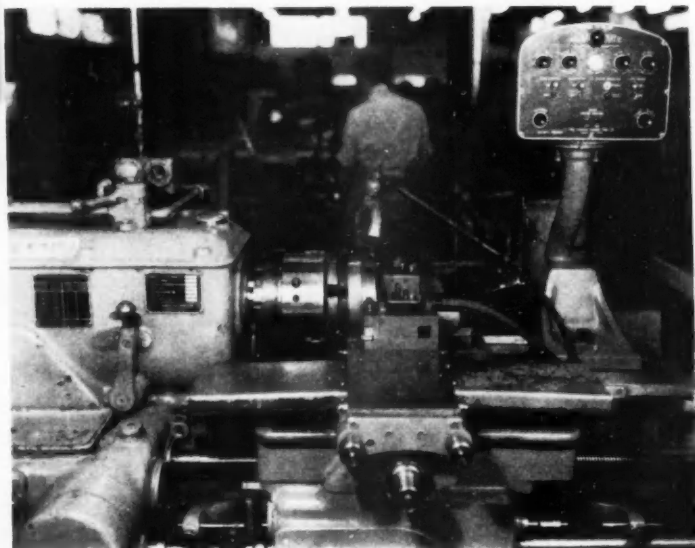
unusual and difficult operation because the 4 in. long hole is 6 in. from the pilot bushing inside the casting.

It may be well at this point to emphasize that the machining of all parts is held to close tolerances, ranging from 0.0003 to 0.0005 in. with special attention to the pilot bores in the crankcase, gear case, starter cover, and other parts that contribute to precision of axial alignment of the final assembly. The crankshaft is machined by methods current in the industry, modified to suit the part. It is a forging of SAE X1020 steel, carburized and heat treated before grinding. It is of two-throw type with throws 180 deg apart, with integral counterweights.

Principal turning operations are done in separate steps in a group of five Gisholt lathes. Pin turning is done in one of these lathes, using an eccentric chuck. Pin grinding and journal grinding is done in latest

## Precision Chris-Craft

By  
**Joseph  
Geschelin**



*Machining of the entire outside formation of the Meehanite flywheel casting is done in one setting in this Monarch Magna-Matic lathe, having a full automatic cycle.*



# Production of Outboard Motors

## Specifications Chris-Craft Challenger Outboard Motor

Model	J
Power head	Read valve, 2-port
Number of cylinders	2-alternate firing
Bore and stroke	2 in. by 1 1/2 in.
Piston displacement	9.42 cu in.
Brake horsepower	5.5 @ 4000 rpm
Weight fully equipped	48 lb
Propeller diam. and pitch	8 1/4 x 8
Starting device	Revolving cord
Fuel tank capacity	1 1/2 gallons
Gear ratio	14-25
Ignition	Scintilla magnets
Carburetor make	Tillotson-concentric bowl type
Exhaust	Under water
Cooling system	Positive rubber oscillator pump
Steering	Full 360° swivel
Stern height	15 in.

type Cincinnati and Landis grinders. Journals are ground to a total tolerance of 0.0003 in. while all pins and journals are finished to a surface finish ranging from 7 to 8-microinch (rms.).

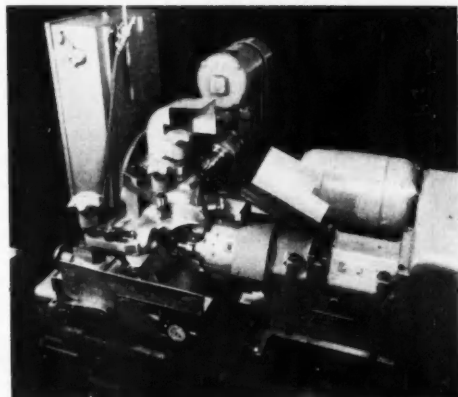
The flywheel is of Meehanite and is finished only on the outside and the bore, the inner cavity remaining unfinished to take advantage of the unique physical properties of the material. The outside finish all over, including turning, facing, and corner radius is done automatically in a Monarch Magna-Matic lathe. Following machining the flywheel is balanced.

The cylinder block is an aluminum die casting with the two liners cast-in as inserts by the supplier. The liners are Meenhanite castings, cut to length by Chris-Craft, rough machined on the OD to aid in securely bonding to the die casting, and rough bored initially.

When received from the supplier the block is subjected to a series of milling operations in small Cincinnati mills, and a sequence of drilling, tapping, counterboring, and similar operations on single spindle

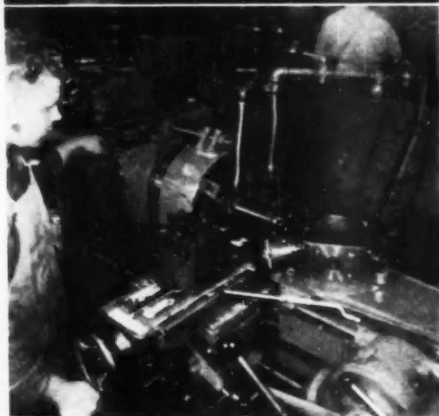
drills. Cylinder liners are precision-bored in a single-end Ex-Cell-O machine with an automatic cycle, holding tolerance on bores to a total of 0.0005 in. Porting for intake and exhaust of each cylinder consists of three accurately drilled holes on each side of the block, drilling through the wall of the casting and liners.

The most fussy operation on the aluminum die-



One of the best examples of Ex-Cell-O precision boring operations in the plant is the two-way boring of the aluminum gear case. The head in the background bores the upper end—to provide piloting for the long hole drilling operation—while the head in the foreground, at right angle to the rear head, bores the propeller shaft line.

Here is a view in the testing department where all motors are run under power with propeller load in the water tank. In the center section as well as at the left may be seen the initial testing of motors before final assembly. At the right is the testing of completely assembled motors.



cast crankcase is the boring and facing of the intake manifold pilot in a single-end Ex-Cell-O precision boring machine. This is a critical operation since the bore serves as a key to vertical axial alignment of the entire assembly.

Pistons are permanent mold aluminum castings with heads typical of two-stroke design. As cast, the piston is held accurately to size and requires a minimum of processing. The first operation is the counter-boring of the inner diameter of the open end of the skirt and this provides the location for OD turning. Turning of the OD and ring grooving is done in a single cycle in an Ex-Cell-O precision boring machine. In this machine the cutting of grooves is done by means of an auxiliary tool holder mounted under the piston, coming into action at the proper point in the cycle with skiving tools. As in the case of other parts, dimensional tolerances are held to 0.0005 in. The piston pin bore also is done by precision boring. By holding tolerances so closely all pistons are made interchangeable and no selective fitting is required with bores at assembly in the motor.

An important feature of the power head is that the three-main bearing line is precision bored and is fitted with replaceable and interchangeable precision bearings—exactly as in automotive practice—the bearings being of bronze, dowelled in the case.

The connecting rods are aluminum die castings with both lower and upper bronze bearings cast-in as inserts. The rod bearing faces are milled to size and

(Turn to page 104, please)

(Above, left) An operation of unusual difficulty is the drilling of the drive shaft hole in the gear case. It is about four-in. in length and starts in the cavity almost six in. below the precision bored pilot at the upper end. Drilling is done with a single-flip drill in this set-up in a single spindle sensitive drill press.

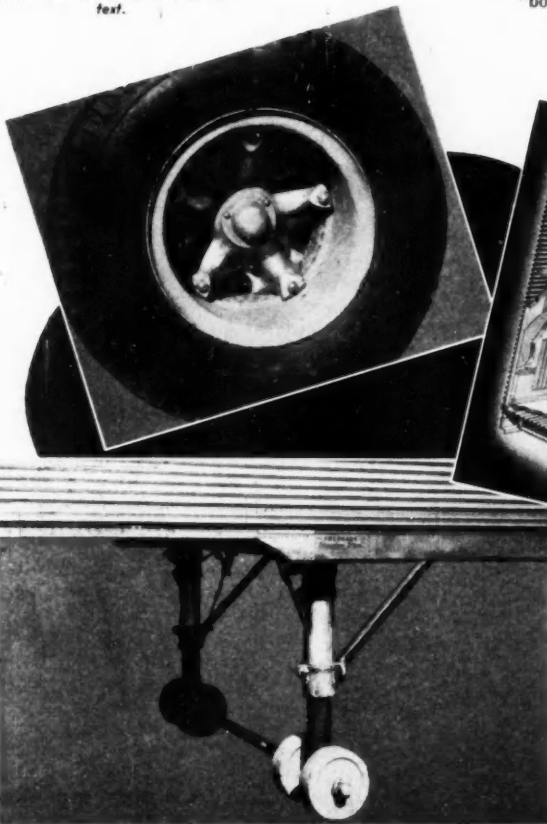
(Left) This is a closeup of one of the battery of five Gisholt lathes set up for machining Challenger crankshafts. In this set-up one entire end is finish-turned

## Magnesium and Aluminum Construction Reduce Trailer Weight Over Half Ton

**E**NGINEERING changes and refinements, together with an increased use of lightweight materials such as aluminum and magnesium, in stainless steel dry-freight and refrigerator vans produced by the Fruehauf Trailer Co., have resulted in total weight savings up to 1250 lb per unit. According to Fruehauf the main weight saving features incorporated in new models now in production are as follows:

Full magnesium floors.

*Here is a closeup of the forged aluminum wheel mentioned in the text.*



Vertical front supports with aluminum castings, stampings and extrusions.

Forged aluminum wheels.

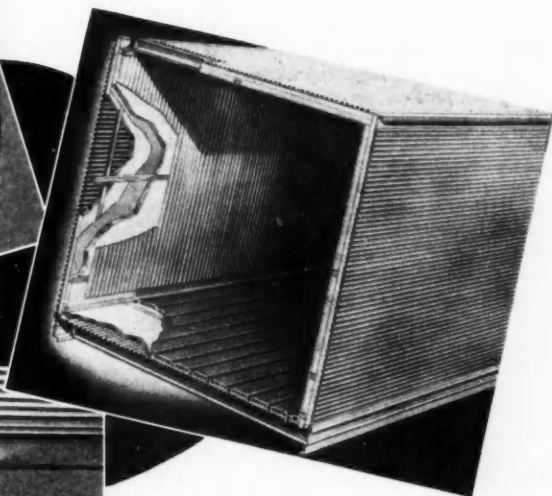
Forged aluminum door hardware.

Pressed steel brake shoes.

Forged aluminum gear boxes (on gravity tandems only).

The magnesium floor for both stainless steel refrigerator vans and dry-freight vans is said to differ from floors used in any conventional practice. It was designed by Fruehauf and is made exclusively for Fruehauf.

The most important element of these floors is the "board." "Boards" are about six in. wide and as long (Turn to page 86, please)



*Cutaway view of the new magnesium floor with details of sidewall construction. The floor is of magnesium with a layer of 1 1/2-in. fiberglass insulation separating the "boards" from the corrugated aluminum sub-floor. Sidewall lining is of aluminum.*

*Front supports for the new stainless steel vans now are considerably lighter through use of aluminum castings, stampings, and extrusions.*

# Fuel Spray Nozzles for

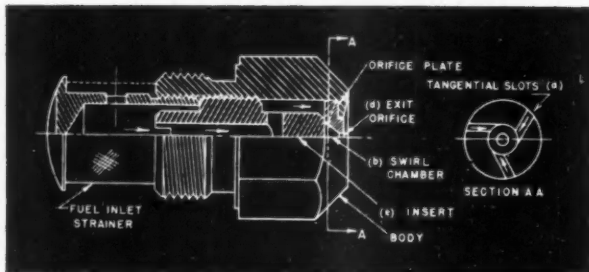


Fig. 1—Fixed orifice swirl type nozzle.

FUEL spray nozzles have been of great importance, and remain one of the most critical items, in the development of aircraft gas turbines for maximum performance and economy. The fuel systems of turbine engines at first appeared to be a desirable simplification of the corresponding metering and distributing equipment for reciprocating engines. They have, however, become more complex, more troublesome, and more expensive than the corresponding equipment of reciprocating engines at their worst.

Fuel nozzles, or devices substituted for them, serve to receive liquid fuel and deliver it to the burner airstream in such a state that vaporization and combustion may be very rapid. This process involves an addition of energy to the fuel to accomplish the transition from liquid form to that of finely divided droplets or vapor. In general, energy may be added to the liquid by the following means:

1. Pressurizing and subsequent conversion to velocity energy in a nozzle.
2. The addition of heat.
3. Use of a secondary fluid such as compressed air to assist in the breaking up of the fuel.
4. Use of moving parts, such as mechanically-driven spinners.

Since the first method, as illustrated by the pressure atomizing nozzle is used almost exclusively on aircraft gas turbine engines, the requirements, design features, and limitations of this method will largely concern the present paper.

An examination of several fuel-spray nozzles at present in common use will at least suggest what the future trend in the development of these nozzles is likely to be. Perhaps, in their present stage of evolution, this is all that can be safely forecast.

\* J. A. Bolt is associate professor of mechanical engineering, University of Michigan and consultant to Engineered Products Co. M. F. Saxton is manager of Engineered Products Co.

## The Combustor Assembly

Before discussing some of the types of fuel-spray nozzles, it may be well to recall their relation to the combustor assembly as a whole. The gas turbine combustor is basically a duct in which the energy of the flowing air charge is increased at constant pressure by the combustion of fuel. In an ideal combustor all of the energy of the fuel would be released to the moving air with no pressure loss in the unit.

In contrast to the reciprocating spark ignition engine, the gas turbine engine at all times burns over-all mixtures much leaner than the chemically correct, or stoichiometric mixture. These lean mixtures are necessary to prevent excessive temperatures at the turbine. To maintain combustion, therefore, it is necessary that the fuel be supplied to only a portion of the airstream, commonly known as the primary air, with which combustion occurs. Subsequently, mixing occurs with the remainder of the air. The wide variation in air flow and fuel flow for a typical engine is indicated in Table I. The wide variation in the flow

shown on this table makes it apparent that it will not be easy to approach the ideal requirements under all engine operating conditions. Also, it would be desirable to increase the

ratio of maximum to minimum fuel flow still further by a large percentage if satisfactory fuel nozzles could be supplied.

By J. A. Bolt  
and M. F. Saxton\*

## Ideal Requirements of a Fuel Nozzle

An ideal fuel nozzle should fulfill the following requirements:

1. It should supply the fuel to the combustor with a pattern and degree of atomization which will give maximum combustion efficiency.
2. The fuel nozzle and combustor should be mutually fitted to each other so that ignition will be positive, and stable flame will be obtained under all operating conditions.
3. It should provide the necessary range of flow to meet all engine conditions with a minimum variation in nozzle supply pressure. This will make the atomizing, pumping, and metering problems easier.

# Aircraft Gas Turbines

## Part I The Design and Performance of Various Types of These Important Units Are Analyzed and Discussed by Two Experts. This Article Is Part I of a Two-Part Series. Part II Will Be Published in an Early Issue of AUTOMOTIVE INDUSTRIES.

4. Pressures and design should be such that the hazard of plugging with dirty fuels will be a minimum. The importance of this quality cannot be overemphasized.
5. The nozzle should not accumulate carbon or otherwise be affected by service conditions.
6. The minimum nozzle supply pressure should not be less than approximately 10 psi to avoid vapor formation in the liquid system.
7. All nozzles in an engine should have flow rates as nearly equal as possible at each engine condition.
8. The nozzle should be small.

### The Swirl Nozzle

The simplest form of the swirl nozzle is the conventional fixed-orifice nozzle. This type of nozzle, as is shown in Fig. 1, imparts a high rotational velocity to the fuel in the swirl chamber so that it leaves the orifice in the form of a thin conical sheet. The sheet or cone moving through the air then causes the liquid fuel to be torn apart and the break up of the particles progresses until their velocity relative to the air is spent. Small particles are desired to aid vaporization.

The nozzle consists of several slots (a) through which the fuel enters the swirl chamber at a diameter

greater than that of the exit orifice. Within the swirl chamber (b) a particle of fluid is forced to rotate in a path of decreasing radius. Analysis of the case of such a vortex without friction shows that the velocity varies inversely with the radius, thus providing high rotational velocity with a moderate size of tangential hole. The liquid will usually not fill the orifice completely, so that there will be an air core in the swirl chamber and the exit orifice. From the vortex in the swirl chamber the fuel passes out the orifice (d) with tangential and axial components. The spray angle formed by the conical sheet is a function of these tangential and axial components. The relative magnitude of these velocities in turn depends principally upon the area of the tangential holes, diameter of swirl chamber, and exit orifice area. The spray angle may, therefore, be expressed in terms of these dimensions. As others have pointed out, the fuel particles travel in straight lines and do not have a swirling motion after leaving the exit orifice.

It is not within the scope of this discussion to include a mathematical development of the equations relating the variables that exist in the nozzle. By neglecting the effects of viscosity and friction, however, expressions can be derived that are very useful in predicting initial dimensions and necessary changes required to meet new requirements.

The relationships between dimensions of the various components and their effect on flow and spray angle have been analyzed and reported by several authors<sup>1, 2, 3</sup>. Much of this fundamental work has been done by men engaged in the industrial oil burner applications. Two equations which have been found very useful for the size of nozzle commonly used in the aircraft gas turbine applications are shown below. They are taken from reference 2, and have been rewritten using the common engineering units:

$$Q_s = \frac{15 \times 10^4 d_s^2 M \sqrt{P_s S}}{L^2 + \frac{M^2}{C^2}} \quad (1)$$

Table I

Engine Operating Condition	Air Flow lb per sec	Fuel Flow lb per hr	Overall Air Fuel Ratio
Take-Off	80	4600	62
Normal Power	60	2800	77
Idling	23	1150	72
Starting	9	650	50
Normal Rating 35,000 Ft Altitude	23	1150	72

$$2 = 2 \tan^{-1} \frac{CL}{M} \quad (2)$$

where the symbols are as follows:

- $Q_o$  = fuel flow, lb per hr  
 $d_o$  = outlet orifice diameter, inches  
 $P_t$  = nozzle supply pressure, psi  
 $S$  = specific gravity of fuel  
 $L$  = ratio of swirl chamber diameter to orifice diameter  
 $M$  = ratio of total tangential inlet to outlet orifice area  
 $C$  = core coefficient, experimentally determined from spray angle measurements  
 $B$  = one-half the included angle of spray

These equations have been found to give good correlation with experimental results for various aircraft turbine nozzles.

Change in oil viscosity has considerable effect upon the nozzle characteristics. As viscosity increases, there is increased surface and internal friction and the rotational velocity of the vortex is reduced. This diminishes the tangential component of the fuel passing out the orifice, resulting in a reduced spray angle.<sup>4</sup> In the usual range of fuel viscosities for aircraft engines, an increase in viscosity increases the fuel flow. This also is a result of the vortex action in the swirl chamber. With less viscous fuel, the rotational velocity is greater, and the air core in the exit orifice is larger. Thus the effective area of the orifice and consequently, the flow from the nozzle, are reduced. The influence of viscosity change will be minimized if the design is such as to keep surface friction to a minimum.

#### Features of Fixed Orifice Nozzles

The construction of the fixed orifice nozzles made by the Engineered Products Co., as shown in Fig. 1, is typical of that used in most common practice. It will be noted that the tangential slots (b) and exit orifice (d) are formed in the same piece. This construction makes easier the problems of concentricity, and places all the close tolerances of the nozzle on this single piece. Since this part is relatively small and is subjected to the highest fluid velocities, it can without undue cost be made of special alloys for best resistance to wear and corrosion. This design employs tangential slots set at approximately 90 deg to the axis of the nozzle to induce the maximum rotational effect in the swirl chamber. Experience shows that the highest standards of accuracy and surface finishes are necessary to obtain uniform flow, spray angle, and spray pattern from large group of nozzles.

Prior to flow checks, it is advantageous to have microscopic inspection of the exit orifice surface finish and edges. Failure to provide highly polished and very uniform surfaces will result in a streaked or non-uniform spray. These inspections are made much easier by having the orifice in a separable orifice piece rather than machined in the nozzle body. Also, in case inspection standards are not met, refinishing can be carried out effectively and scrap reduced to a minimum.

The flow of the nozzle of Fig. 1 is approximately a function of the square root of the nozzle supply pressure, which is also indicated by the theoretical equation (1).

The degree of atomization of the spray is a function of the velocity of exit which has been imparted to the stream issuing from the nozzle. It follows, therefore, that the atomization is also somewhat proportional to the square root of the pressure. Below some minimum pressure and corresponding low flow the particle size will not be small enough for proper engine operation. This commonly establishes the minimum usable nozzle supply pressure. If the required ratio of flow from maximum power to idling or starting is 20 to 1, then the necessary

pressure change to obtain these flows is  $(20/1)^2$  or 400 to 1. Thus, if the minimum usable pressure is 10 psi, then the necessary pressure to obtain the high flow will be 4000 psi. Since there is conflict in these requirements, unfortunate compromises have been made necessary in the matter of starting and idling sprays, and the bulk and cost of pumps and metering equipment capable of handling the high pressure requisite to the maximum flow. Even though some engine installations are using nozzle supply pressures of at least 2000 psi with fixed orifice nozzles, these are not giving completely satisfactory performance. In spite of these problems, fixed-orifice nozzles have been and are continuing to be used in many engines. This fact indicates that alternative methods are still beset with many difficulties.

#### Wide Range Nozzles

Good atomization through a wide range of fuel flows can only be obtained by maintaining a relatively high fuel pressure at all times, or by supplying an additional source of energy, such as compressed air. If the energy for atomization is to be obtained from the pressurized liquid fuel, then means must be provided for varying the coefficient of discharge of the nozzle, so that the pressure and flow can depart from the

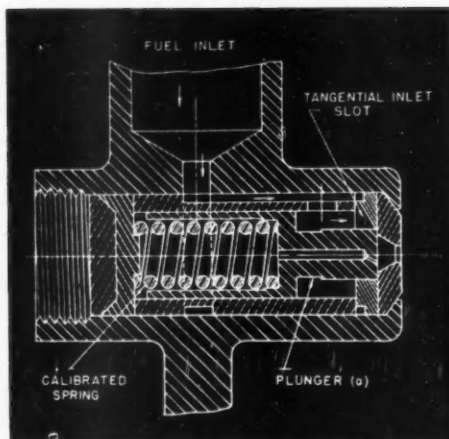


Fig. 2—Variable inlet slot nozzle.

quadratic relation. Designs of this type used in production vary the size of the inlet holes to the swirl chamber. This has been done in preference to varying the size of the exit orifice mainly because of the difficulty involved in satisfactorily changing the area of the exit hole.

### Variable Inlet Slot Nozzles

The variable-inlet-slot type of nozzle which is illustrated by the sketch of Fig. 2, employs a stepped plunger (a) acted upon by fluid pressure which uncovers additional slot area with increasing pressure. It is apparent that as the inlet slot area increases with increasing pressure, the ratio of inlet slot area to exit orifice area grows larger. Examination of the equation (1) reveals that this will give an increased angle of spray at low flow.

The objections to this type of device lie principally in the close fitted sliding parts, the necessity for highest quality of filtering to prevent sticking and plugging, and difficulties of calibrating a group of units to give equal flow throughout the range of flow rates.

An important step occurred about 1921 which helped remove the range limitations of the fixed-orifice nozzle.

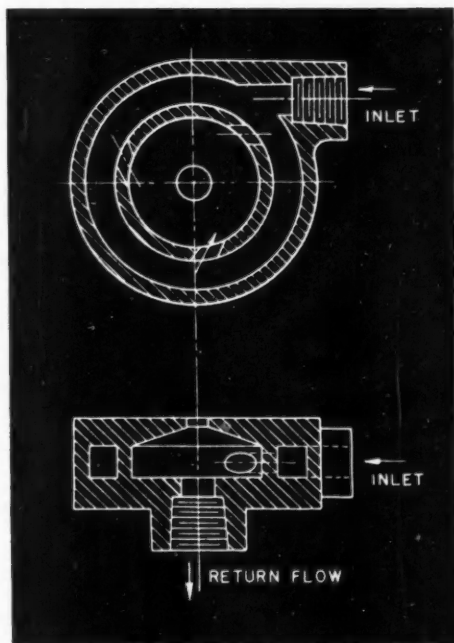


Fig. 3—Return flow nozzle.

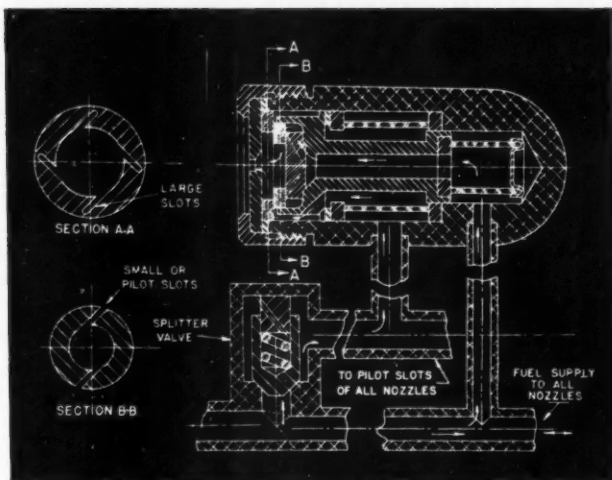


Fig. 4—Duplex nozzle with splitter valve.

### Return Flow Nozzle

This was the development of the Peabody-Fisher wide range nozzle of the return flow, or spill type, shown schematically in Fig. 3. The unit was developed for use on oil-burning marine-boiler installations. In this type, quite large tangential holes are used to supply liquid to the swirl chamber. Reduced flow from the nozzle orifice is obtained by bleeding liquid from the center, or other section, of the swirl chamber. Thus a relatively high degree of rotational energy is maintained at the low flows. Advantage has been demonstrated by having the return flow line concentric with the exit orifice and swirl chamber and of larger diameter than the exit orifice. This permits the air core to develop with less friction and it can even extend into the return flow line.

This nozzle may be considered as the equivalent of the previously described variable inlet slot unit if part of the inlet slot area is considered as being rendered inoperative, not by a sliding plunger, but by fluid which is being recirculated.

This type of nozzle has attractive advantages, particularly at low flows, since the recirculated fluid provides energy for maintaining a strong vortex in the swirl chamber.

### The Duplex Nozzle

The urgent problem of obtaining satisfactory spray through a wider range of flows has led to the use of duplex nozzles on most current production gas turbine engines in the United States and England. A sketch illustrating this type is shown in Fig. 4. The duplex nozzle employs two sets of inlet holes to the swirl chamber. At low flows the fuel is supplied only to the small, or pilot, set of tangential holes. The objective, as in the previous two types discussed, is to maintain

(Turn to page 64, please)

**Table I—Production of Internal Combustion Engines Including Automobile and Aircraft—1947**

Gasoline and Other Carburetor <sup>(1)</sup>	
Automobile <sup>(4)</sup>	5,766,578
Aircraft <sup>(2)</sup>	18,934
Outboard	584,458
All Other	2,140,516
<b>Total—Gasoline</b>	<b>8,510,486</b>
Diesel and Semi-Diesel	
Automobile	9,979
All Other	108,900
<b>Total—Diesel</b>	<b>118,879</b>
Gas	3,622
Other <sup>(3)</sup>	55,944
<b>Total—All Engines</b>	<b>8,688,931</b>

<sup>1</sup> Includes Kerosene and Distillate Engines.

<sup>2</sup> Conventional type only.

<sup>3</sup> Consist entirely of Carbon Dioxide model aircraft engines of special design and dual fuel type engines such as gasoline-kerosene, gasoline-gas, Diesel-gas, etc.

<sup>4</sup> Built by passenger car, truck and bus manufacturers.

# First

By  
Marcus  
Ainsworth

**Table II—Gasoline and Other Carburetor Engines (Except Automobile, Aircraft and Outboard) Production and Shipments in Units and Their Value**

(Dollar Values in Thousands)

Hp Classifications	Total Production	Shipments to Other Companies		Production for Use in Products of the Same Company
	Units	Units	Value at Plant	
2.9 hp and under	1,014,074	952,208	\$34,362	61,816
3.0 to 5.9 hp	261,771	196,336	14,666	65,435
6.0 to 10.9 hp	130,777	85,473	8,216	45,304
11.0 to 20.9 hp	144,918	90,419	13,501	54,499
21.0 to 40.9 hp	409,526	130,382	24,559	279,144
41.0 to 50.9 hp	36,967	25,446	7,406	11,521
51.0 to 70.9 hp	72,994	55,205	14,612	17,789
71.0 to 90.9 hp	27,176	24,224	9,154	2,952
91.0 to 150.9 hp	39,434	33,017	19,366	6,417
151.0 hp and over	2,879	2,622	8,276	257
<b>Total</b>	<b>2,140,516</b>	<b>1,595,332</b>	<b>\$154,118</b>	<b>545,184</b>

**Table III—Diesel and Semi-Diesel Engines (Except Automobile) Production and Shipments in Units and Their Value**

(Dollar Values in Thousands)

Hp Classifications	Total Production	Shipments to Other Companies		Production for Use in Products of the Same Company
	Units	Units	Value at Plant	
30.9 hp and less	14,896	13,931	\$8,939	965
31.0 to 50.9 hp	12,827	4,138	4,414	8,689
51.0 to 100.9 hp	49,917	28,334	33,942	21,583
101.0 to 150.9 hp	19,763	13,724	32,440	6,039
151.0 to 400.9 hp	8,580	7,389	33,555	1,191
401.0 to 600.9 hp	471	436	12,252	35
601.0 to 800.9 hp	473	231	7,519	242
801.0 hp and over	1,973	434	28,731	1,539
<b>Total</b>	<b>108,900</b>	<b>68,617</b>	<b>\$161,792</b>	<b>40,283</b>

**M**ANUFACTURERS of cars, trucks and buses produced 5,766,578 gasoline and other carburetor engines during 1947 and 9,979 Diesel and semi-Diesel engines. The aircraft engine manufacturers produced 18,934 conventional type engines and the producers of outboard motors built 584,458 outboards.

Others producers of engines for either resale or for incorporation into their own products manufactured 2,140,516 gasoline and other carburetor engines, 108,900 Diesel and semi-Diesel engines, 3,622 gas engines and 55,944 other type engines such as model aircraft engines and dual fuel type engines.

The combined total of all engines produced by all engine builders amounted to 8,688,931 during the year 1947.

These and many other important details concerning internal combustion engine production have just been released in a comprehensive report compiled by the Metals and Metal Products Section, Industry Division, Bureau of the Census. For the first time we have in one combined report, total internal combustion engine production, with the exception of motorcycle engines and aircraft gas turbine engines. A summary of the above

# Report on Total Engine Production

*Census Figures Show United States Output in 1947 Amounted to 8,688,931 Units, Including 8½ Million Carburetor Engines and 118,879 Diesels*

data will be found in Table I on the facing page.

As no data were collected on the horsepower and piston displacement of the automobile and aircraft gasoline and Diesel engines, no breakdown has been prepared for these two classifications, but in Tables II, III, IV, V and VI will be found horsepower and displacement classification breakdowns for all engines produced by other than automobile and aircraft engine builders.

It is significant that while the automobile manufacturers (passenger car, truck and bus) built 5,766,578 during 1947, production of new vehicles during that year amounted to 4,797,820, a difference of 968,758 engines. No doubt some of these engines came off the production line at the end of the year for installation in new vehicles early in 1948, but it is believed that the greater part of this excess production was for the purpose of supplying replacement engines.

Of added interest is the fact that of the 2,140,516 gasoline engines produced by other than automobile and aircraft engine builders, over 72 per cent were (Turn to page 82, please)

**Table IV—Gasoline and Other Carburetor Engines (Except Automobile, Aircraft and Outboard) Production and Shipments in Units and Their Value**

(Dollar Values in Thousands)

Displacement Classifications	Total Production	Shipments to Other Companies		Production for Use in Products of the Same Company
	Units	Units	Value at Plant	
8.9 cu. in. and less .....	932,482	882,880	\$29,938	49,622
9.0 to 30.9 cu. in. ....	403,962	303,768	22,490	100,194
31.0 to 50.9 cu. in. ....	61,655	44,942	5,561	16,713
51.0 to 100.9 cu. in. ....	131,640	95,713	13,875	35,927
101.0 to 150.9 cu. in. ....	251,125	89,616	15,474	161,509
151.0 to 300.9 cu. in. ....	269,791	131,594	35,674	138,197
301.0 to 400.9 cu. in. ....	53,134	29,427	12,095	23,707
401.0 to 500.9 cu. in. ....	20,450	8,923	5,418	11,527
501.0 cu. in. and over .....	16,277	8,489	13,593	7,788
<b>Total .....</b>	<b>2,140,516</b>	<b>1,595,332</b>	<b>\$154,118</b>	<b>545,184</b>

**Table V—Diesel and Semi-Diesel Engines (Except Automobile) Production and Shipments in Units and Their Value**

(Dollar Values in Thousands)

Displacement Classifications	Total Production	Shipments to Other Companies		Production for Use in Products of the Same Company
	Units	Units	Value at Plant	
16.0 to 100.9 cu. in. ....	8,391	7,674	\$3,777	717
101.0 to 200.9 cu. in. ....	10,257	9,010	7,204	1,257
201.0 to 300.9 cu. in. ....	30,308	20,021	22,356	10,287
301.0 to 500.9 cu. in. ....	29,968	14,486	22,214	15,482
501.0 to 1000.9 cu. in. ....	18,206	9,969	25,792	8,237
1001.0 to 2000.9 cu. in. ....	7,980	5,300	21,686	2,680
2001.0 to 5000.9 cu. in. ....	1,066	1,022	11,085	44
5001.0 to 10,000.9 cu. in. ....	1,920	414	10,875	1,506
10,001.0 cu. in. and over .....	794	721	36,803	73
<b>Total .....</b>	<b>108,900</b>	<b>68,617</b>	<b>\$161,792</b>	<b>40,283</b>

# Army to Spend Over \$83 Million for Vehicles in Fiscal '50

By EUGENE J. HARDY,  
Washington Bureau,  
AUTOMOTIVE INDUSTRIES

**D**ESPITE a substantial cut in the appropriations for Army Ordnance, there is not likely to be any great change in Ordnance's plans to purchase some \$83,120,850 worth of new vehicles during the fiscal year 1950. Ordnance intends to buy 16,281 trucks, 48 ambulances, and 1264 sedans, which will be used largely to replace unserviceable equipment.

The primary reason for the large anticipated purchases is the fact that no new vehicles were purchased after the end of the war until last year when \$37 million was made available for this purpose. Except for those purchased during the current fiscal year, the youngest military type trucks came off the production line in 1945. Most trucks now in use by the Army are about five years old, and are not now suitable for use in case of emergency, and maintenance costs are reported to be prohibitively high.

General Omar N. Bradley, Army Chief of Staff, told the House Appropriations Committee that "it is true that we have quite a number of trucks left over from World War II. The question comes up, however, whether or not it would be sound economy to send our first units overseas with trucks, five, six or seven years old. It is essential that we start a replacement program for those trucks to get new equipment which we think we should have for the first units that go overseas."

The age of the vehicles has resulted in a rather high rate of scrapage. During the current fiscal year, the Army expects to dispose of a total of 8450 units for a total of \$2,563,433. All such vehicles sold are uneconomically repairable and for purposes of the Ordnance Dept. are considered in the same category as junk or salvage. The cost of overhaul is the major consideration when it comes to junking vehicles. Generally speaking, the Army figures that when it costs approximately 35 per cent of its original cost to overhaul, it is no longer profitable to overhaul the truck. The Ordnance Dept. also recovered \$1,886,100 from the sale of spare parts during the fiscal year 1949.

Included in the appropriations cut were specific directions to reduce the number of gadgets procured for non-

combat vehicles. The House Appropriations Committee was particularly incensed at finding that the Army intended to purchase Jeeps at a cost of approximately \$2500 each, which included \$823.14 for so-called extras and \$500 for one year's supply of spare parts, including pipe line requirements.

Starting with an initial delivered price at the factory of \$1176.86, Ordnance officials disclosed that the additional \$823.14 was accounted for as follows: shock absorbers, \$15; changing the engine to a 24-v electrical system, radio sheathing and waterproofing, \$275; heavier frame, \$100; rear bumperette, \$10; heavy springs, \$2; change in axle ratio and sealing, \$85; transmission change, \$10; new propeller shafts, \$48.14; lift hook, \$2; larger gas tank, \$6; exhaust

(Turn to page 64, please)

## Breakdown of Proposed Army Vehicle Purchases for the 12-Month Period Beginning Next July 1

	Quantity	Unit Cost	Total
Ambulance, $\frac{3}{4}$ -ton, 4x2, Metropolitan (without spare parts) .....	48	\$4,000	\$192,000
Car, five-passenger, medium sedan (without spare parts) .....	36	1,380	49,700
Car, five-passenger, light sedan (without spare parts) .....	1228	1,300	1,595,750
Truck, $\frac{3}{4}$ -ton, 4x4, with equipment and with concurrent spare parts .....	6320	2,500	15,800,000
Truck, $\frac{3}{4}$ -ton, 4x4, improved type, with equipment and with concurrent spare parts .....	2663	4,300	11,450,900
Truck, $2\frac{1}{2}$ -ton, 6x6, improved type, with equipment and with concurrent spare parts .....	6705	6,300	42,241,500
Truck, five-ton, 6x6, new type, with equipment and with concurrent spare parts .....	589	19,000	11,191,000
Truck, eight-ton, 8x8, with equipment and with concurrent spare parts .....	4	150,000	600,000
<b>TOTAL</b> .....			<b>\$83,120,850</b>

# Knock-Free

## Diesel Operation

LONDON Passenger Transport Board, which operates more than 5000 Diesel buses in the English capital, announces that it has eliminated Diesel knock by the use of pilot injection, and that existing vehicles will be converted to this system. It is claimed that the degree of silence is comparable to that of a gasoline engine and that performance is improved.

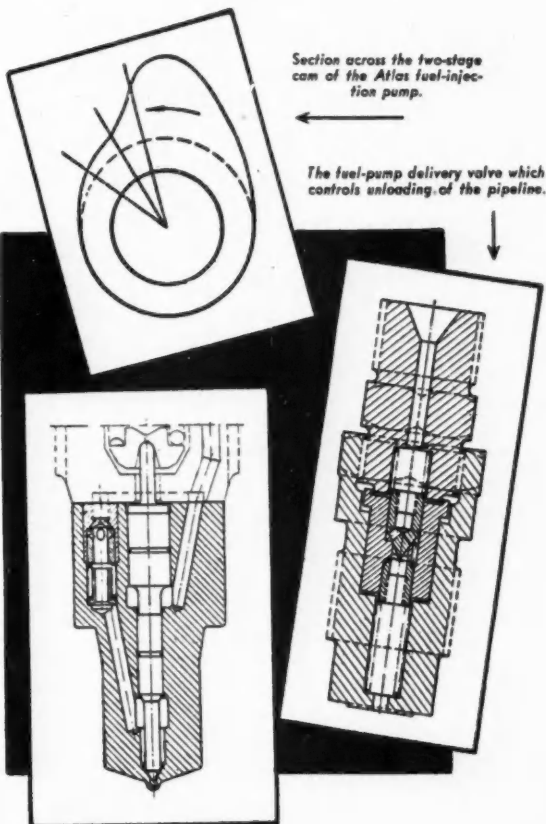
The system to be used is reported to be the one developed by the Atlas Diesel Co., of Stockholm. There is a first or pilot injection followed by the main charge, this being obtained by a combined pump and injector with two spill ports in the pump sleeve so arranged in size and shape that pilot injection is effected with the use of a two-stage cam contour. Pilot injection is constant at all deliveries, being the amount of fuel necessary for idling.

The pilot injection is made at a low fuel speed and pressure, and is directly continued during the latter stage where the fuel pressure and speed are increased. Because of the low injection rate of the early period, it is claimed that the quantity of fuel present in the combustion chamber when ignition occurs is so small that the pressure rise on combustion is insufficient to create knock or violent stressing of the engine parts. With the high temperature built up in the cylinder by the first stage of combustion, fuel injected later burns successively as it enters the cylinder.

The injection pump cam is designed to start pumping from the base circle of the cam and the first contour gives a relatively

low and nearly constant injection pressure. This is followed by the second stage of injection where the cam has a relatively sharp slope, providing an injection pressure that is successively increased to its maximum value. A smooth curve between the two contours prevents interruption of injection when passing from the low to the high pressure stage.

(Turn to page 60, please)



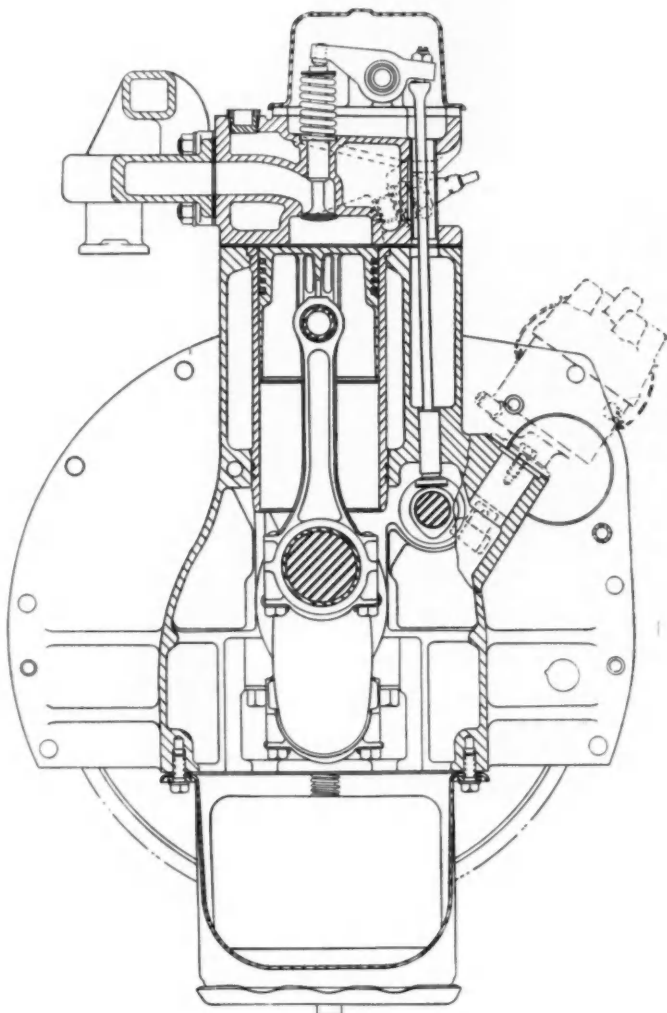
Drawings reproduced by courtesy of The Commercial Motor (London)

The injector nozzle designed to open at a low pressure and close at a high pressure.

# Ferguson

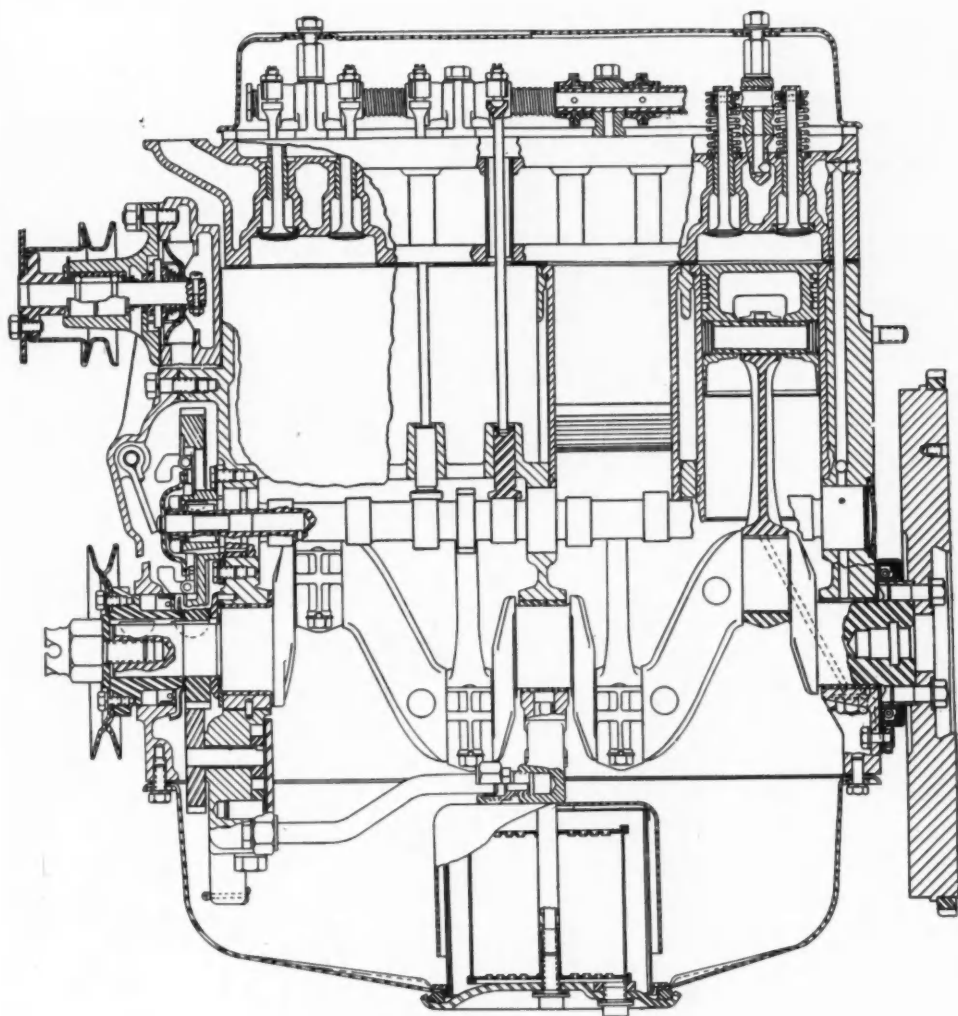
## GENERAL SPECIFICATIONS

No. of Cylinders.....	Four
Bore and Stroke (in.)	$3\frac{3}{16}$ by $3\frac{3}{4}$
Piston Displacement (cu in.).....	120
Power at Governed Speed (Bare Engine).....	30 hp at 2000 rpm
Fuel.....	Gasoline
Tractor Belt Hp (Nebraska Test)...	26.5 hp



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# TO-20 Tractor Engine



# Unique Fuel System on Indianapolis Racer

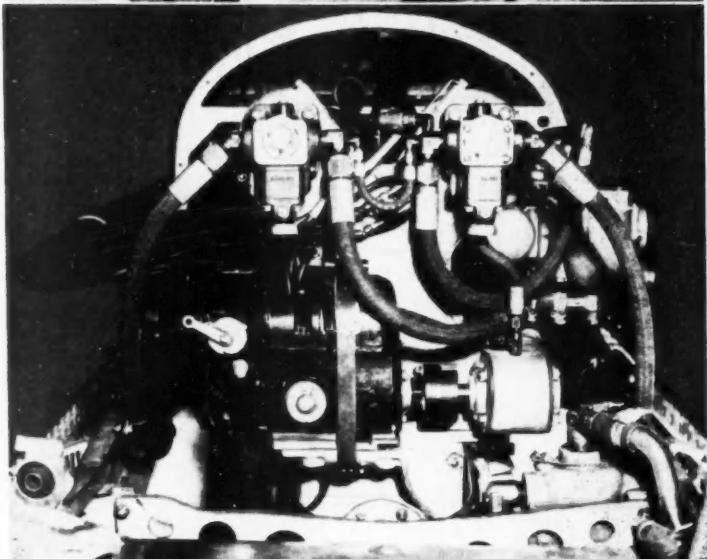
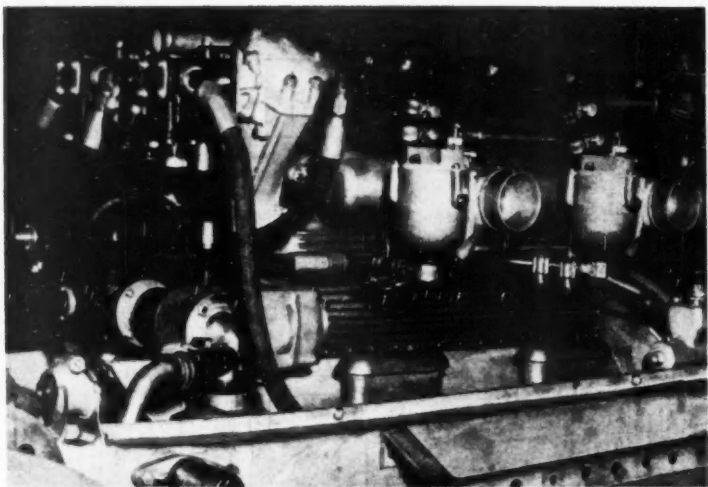
*Unusual Arrangement,  
Which Incorporates  
Fuel Supply and Scav-  
enger Pumps, Eliminates  
Need for Conventional  
Carburetor Float*

A UNIQUE fuel supply arrangement has been developed by Murrell Belanger who has entered two cars in this year's race on May 30 at Indianapolis. The system employs two Titan fuel pumps, mounted on the timing gear cover and driven by the camshafts. One of the pumps supplies fuel to the two horizontal carburetors while the other acts as a scavenger. The scavenger pump is connected to a tube located in each carburetor with its open end at the desired fuel level. This arrangement does away with the need for the customary carburetor float which is not always entirely satisfactory under some racing conditions.

Both Belanger Specials are rear-drive cars powered by 270 cu-in. non-supercharged Meyer-Drake engines. Duane Carter, who qualified with an average of 126.015 mph last year, will drive the same Belanger entry again this year. Ralph Pratt has been named as the driver of the other Belanger Special, which was driven by Tony Bettenhausen in the 1948 Indianapolis race.

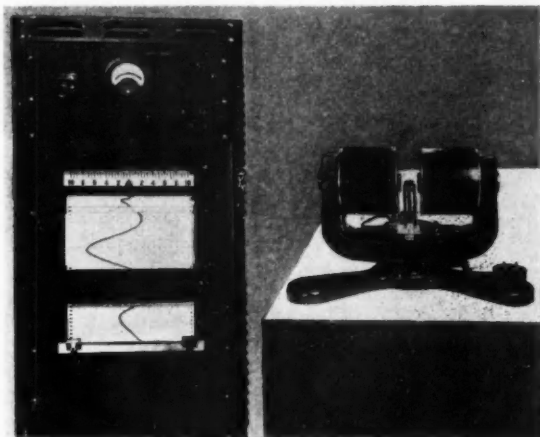
*Top view shows the two horizontal carburetors, mounted on a common manifold, which are supplied with fuel by one of the two pumps while the other pump acts as a scavenger.*

*The illustration at the right shows how the fuel lines and pumps are arranged at the front of the engine.*



# Magnetometer Indicates Drawing Quality of Steel

Overall view of test setup for determining the drawing quality of steel sheet. The torque magnetometer for testing the magnetic property of a small disk sample is shown at the right. On the left is the recording equipment for making the curve that tells the drawing quality.



A NEW electronic instrument called the "recording torque magnetometer," which measures and records automatically the mechanical torque exerted by a uniform magnetic field on a circular disk of sheet iron or steel to determine uniformity of its magnetic properties, has been developed at the Research Laboratory, United States Steel Corp. of Delaware, in Kearny, N. J. The recording torque magnetometer uses flat steel samples one in. in diameter. It makes a recorded reading in six minutes.

Investigations have demonstrated that measurement of an inherent magnetic property indicates whether or not one kind of steel can be shaped to the curves of fenders and bodies for automobiles. The same magnetic property also provides a clue to the formability of other types of steel into other deep shapes, while an opposite indication in a different kind of steel determines its suitability for transformers.

The torque magnetometer has two strong electromagnetic coils, placed end-to-end with a short gap between them. The specimen disk is mounted horizontally between the coils and rotated one-half revolution in six minutes by a synchronous motor driving through reduction gearing.

As it turns, the disk resists rotation in some positions, while in others it has a tendency to assist rotation or jump ahead. If

(Turn to page 108, please)

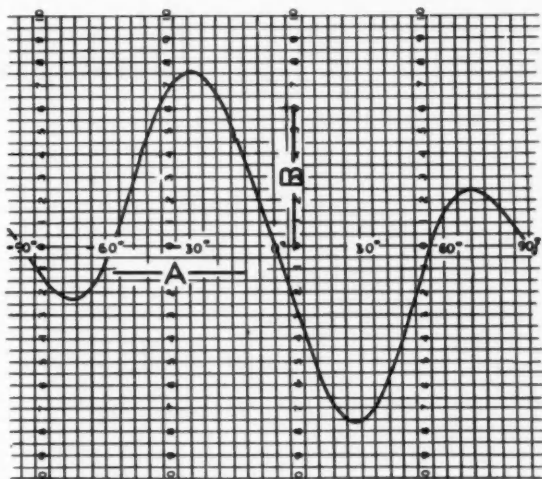


Fig. 2 (Above) Magnetic torque of high quality transformer steel which is very anisotropic.

(A) Angle between magnetic field and rolling direction  
(B) Torque per unit volume (in dyne—CM./CU.CM.) multiply by 20,000

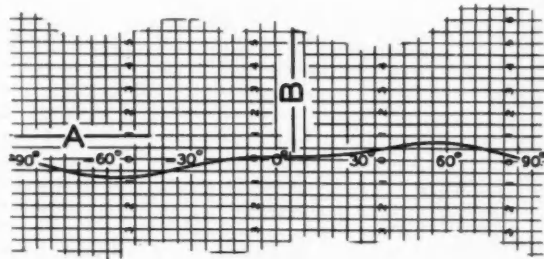


Fig. 1 (Left) Magnetic torque of a sheet steel which is nearly isotropic.

(A) Angle between magnetic field and rolling direction  
(B) Torque per unit volume (in dyne—CM./CU.CM.) multiply by 20,000

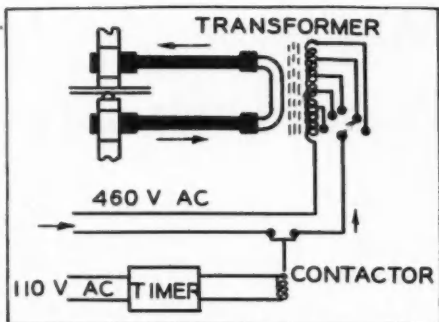
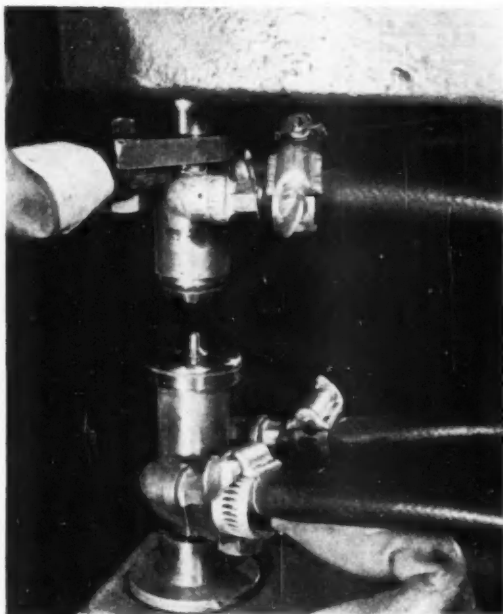


Fig. 3—Schematic drawing of the transformer circuit for the resistance-heating electrodes and dimpling tools.

Fig. 2—(Left) Closeup view of the resistance-heating electrodes and dimpling tools.

By H. R. CARNS, Process Analyst  
Materials and Process Engineering Dept.  
Northrop Aircraft Inc.

## Hot Dimpling Magnesium

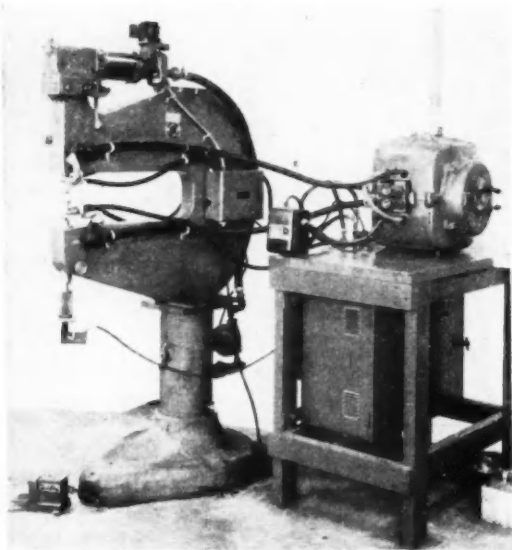


Fig. 1—Northrop Aircraft's resistance-heating equipment setup for dimpling magnesium skins for aircraft.

**D**IMPLING of magnesium skins for aircraft requires the application of techniques where an adequate source of heat is available. The resistance dimpling method, applied originally to 75STAL aluminum sheet, supplies the required heat source and has been adapted for dimpling of magnesium sheet. However, the use of this method incurs certain restrictions which make it advisable to compare this method with the conduction heating method. Such a comparison shows the conduction method of heating magnesium to be the more satisfactory in terms of production dimpling.

### Direct Resistance Heating

The direct resistance method, developed by the University of California, has been found to be very economical for both operating and maintenance costs. After the initial capital investment for the machine was made, maintenance costs have amounted to no more than on any other machine subject to normal wear. Figs. 1 and 2 illustrate the machine and its equipment.

In the schematic diagram (Fig. 3), the source

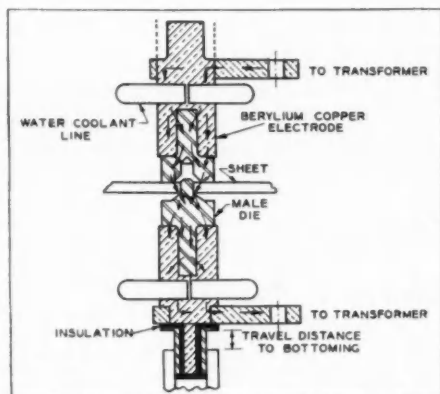


Fig. 4—(Left) Current flow diagram for the resistance-heating setup.

Fig. 5—(Below) Front and side view of the resistance-type hot dimpling head.

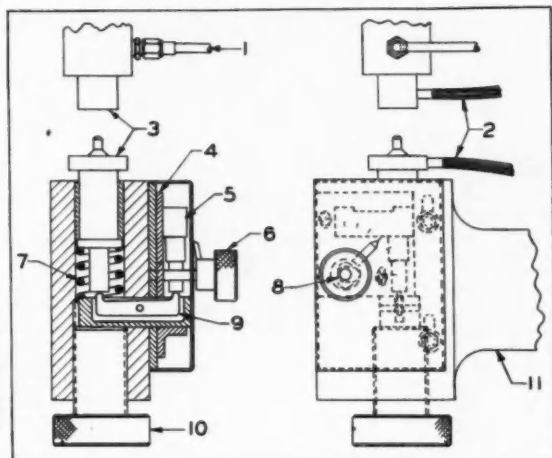


Table 1—Machine Setting and Tensile Strength for Test Specimens

Timer Setting	Pressure Setting	Transformer Setting	Maximum Tensile Strength for Type A Specimen
1	90 psi	1-3	2120 psi

## Sheet

*Investigation Shows That Conduction Method of Dimpling Magnesium Sheet for Aircraft Is More Satisfactory for Production*

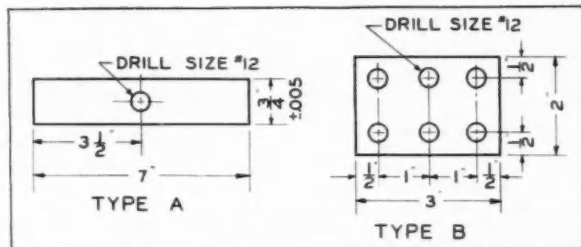


Fig. 7—Test specimens for 3/16 in. dimple, 0.051 in material thickness.

of current for resistance dimpling is an 18 kva spotweld transformer. The transformer has a combination of 16 settings. It gives a current output ranging from 2000 to 5000 amp. The open circuit voltage of the primary transformer ranges up to six volts (Fig. 4). This large amount of current is carried to the electrode holders through heavy bus bars. The electrodes are made of Mallory No. 100 and are water cooled by means of  $\frac{3}{8}$  in. holes drilled through the sides of the electrodes. The dimple punch and die which are seated in the electrodes are made of hardend tool steel and have a dimple geometry which gives a sharp, well de-

*(Turn to page 98, please)*

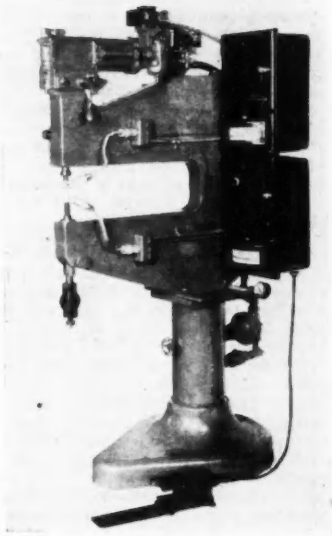


Fig. 6—Northrop's construction-heated coin dimple machine. (Photo courtesy of Zephyr Mfg. Co.)

# AIRBRIEFS



By ROBERT McLARREN

## Naval Aviation Doomed?

From all current indications Naval Aviation is on the way out of the U. S. defense picture. The one service about which there has never been any dispute concerning its world leadership now appears doomed as a major weapon in the nation's arsenal. Cancellation of the U.S.S. United States, the 65,000-ton super-carrier, the resignation of Secretary John L. Sullivan, continuing additional orders for the Convair B-36 bomber, and the reported insistence by Secretary of National Defense Louis Johnson that Naval Aviation be assigned to other services all add up to an eventual abolition of this branch of the service, except for such ancillary duties as sea search and rescue, anti-submarine warfare, communication, etc. So long as the primary problem of U. S. defense consists of the delivery of the atomic bomb on Russian targets in the fastest, most economical way, then the Air Force's big B-36 bomber will remain our No. 1 weapon. But many observers believe this an oversimplification of the problem and that "single weapon" thinking can prove catastrophic in any future war. They therefore plead for continued development of the aircraft carrier and its tactical possibilities along with amphibious warfare, infantry equipment, artillery and other such "outmoded" phases of war with relative emphasis depending upon the changing concept of national defense created by the international situation as it progresses.

## Air Force Victory

There is little question but what the Air Force now has the strategic and appropriation ball. The House Appropriations Committee has approved a fiscal 1950 budget figure of 2217 million for the purchase of 2550 new aircraft, the highest expenditure for the purpose since V-J Day. For the second straight year the Committee voluntarily increased the President's request by more than \$800 million (\$822 million last year, \$851 million this year), indicating Congressional desire to build the Air Force in an orderly manner toward its now-classic 70-group status by 1952. This new money will maintain the Air Force at its 59-group level including three heavy bombardment, six medium bombardment, three all-

weather fighter, and 17 day fighter groups (the remainder being diverse auxiliary groups).

## Air Lift Continuation

While present U. S.-Russian negotiations may lead to an early end to the Berlin blockade, indications are strong in Washington that even though this important decision should be reached, the Air Force will continue "Operation Vittles" indefinitely. Of the many reasons, the principal one is to provide protection against a future sudden reinstatement of the blockade, indicating a new U.S. realism toward Russian political character. The post-blockade operation will be considerably different, however, in that fewer but much larger cargo aircraft would be used. Now scheduled for the air lift is the Boeing C-97A ("Stratocruiser") and the Douglas C-124A ("Liftmaster"), which will reduce by more than one-half the number of airplanes required to deliver the required tonnage. These huge new aircraft (50,000-ton payload for the C-124, 43,000-ton payload for the C-97) will reduce the traffic problem, aircrews, maintenance, supplies, etc., although the cargo-handling crews will remain the same.

## Landing Sans Gear

The British often make up in courage what they lack in originality. The latest example is a "flexible" carrier deck on which the British Navy has successfully operated a DeHavilland Vampire jet fighter. The deck of H.M.S. Warrior was covered with a rubberized material, a Vampire equipped with a belly skid and the combination taken to sea. The Vampire was catapulted, circled and made a successful landing on its belly. Obvious advantage is the 5-15 percent landing gear weight saving, which can be put to more profitable use as increased range through added fuel tankage. The idea is many decades old, but this is the first practical and successful test. The British Navy will continue the trials, which will be watched with interest by the U. S. Navy.

## Non-Flying Profitable?

The Government recently extended its unique theory of paying for things

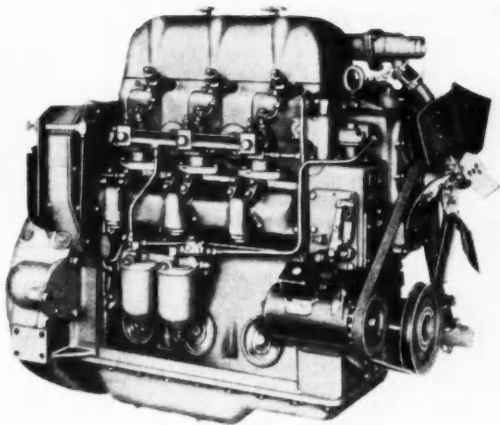
not grown or done by awarding five major U. S. airlines payments covering the period during which many of their aircraft were grounded. TWA, United and American will receive \$2 million each for their losses during the periods that the Lockheed Constellation and (later) Douglas DC-6 were grounded by the Civil Aeronautics Board. The exact amounts have not yet been determined for National Airlines (DC-6) and Northwest Airlines (Martin 2-0-2). Idea is that planes were grounded by the CAB and, therefore, the Government should cover the losses in revenue accruing therefrom. But two complaints have already been registered: American says \$2 million is not enough and claims its losses ran between \$5 and \$10 million; Sen. Maybank (Dem., S. C.), a member of the Senate Appropriations Committee, calls the action "absolutely absurd" and says: "I cannot even understand anyone suggesting that the Federal Government pay private companies for not operating planes!" The House Appropriations Committee also was "utterly amazed" at the grant "for transportation of air mail, a single pound of which they never actually carried!" Ho hum—so this is Washington!

## Jet Transport Near

While the U. S. continues to debate, the British are quietly going ahead with a production order for 16 DeHavilland "Comet" jet airliners scheduled for delivery to BOAC and BSAA in 1952. The swept-wing passenger liner will be powered by four DeHavilland Ghost turbojet engines of 5000 lb thrust each and will carry a crew of 4 and 36 passengers at a cruising speed of 500 mph. The craft will operate a six-hour schedule between London and New York. The entry of this superliner into trans-Atlantic service will put real teeth into the argument that private enterprise U. S. airlines cannot compete with government-owned foreign airlines. All U. S. airlines are militantly agreed that the jet airliner cannot possibly be operated at a profit, yet its competition will force an issue in 1952 that the airframe industry should be preparing for now. Major airframe manufacturers (notably Douglas and Lockheed) have prepared interminable design studies of gas turbine-powered passenger airliners, but the question is always: "Where is the \$60 million development cost to come from?" In Britain it is the government; in the U. S. nobody knows. Both the airlines and the industry have withdrawn active support of the "prototype bill," yet this appears the only means through which this coming competition can be met. Anybody have any suggestions?

(Turn to page 106, please)

# Harnischfeger Develops Three Lightweight Diesels

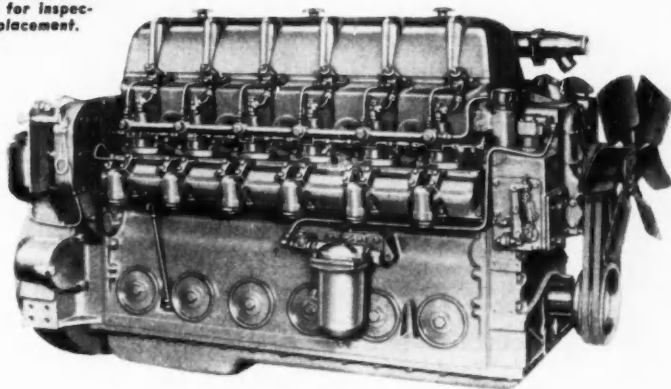


(Above) Model 387-C three-cyl P&H engine.

(Left) Here is the P&H cylinder head and liner assembly. It is easily removed from the engine for inspection or replacement.



(Below) Model 687-C six-cyl engine. Both models have large inspection ports as shown for removal of connecting rod caps without disturbing the oil pan.



**T**HE Harnischfeger Corp., Port Washington, Wis., has entered the engine-building field with three lightweight Diesel engines—a two-cylinder, a three-cylinder and a six-cylinder model. Announced to the trade as P & H Diesel engines, they are full Diesels employing the two stroke principle, with a bore of 4.5 in., a stroke of 5.5 in., and a displacement of 87.5 cu. in. per cylinder. The Model 287-C has a continuous hp rating of 45 at 1400 rpm; the Model 387-C is rated at 65 hp for continuous duty; the Model 687-C has a continuous duty rating of 130 hp. All pins and journals are drilled for continuous pressure lubrication. The camshaft is a heat treated alloy steel forging, with pressure lubrication to its bearings. Both engines have a compression ratio of 16 to 1. Parts are interchangeable from one model to

another with, of course, the exception of such parts as the crankshaft, camshaft, crankcase, etc., which are necessarily different due to the added number of cylinders.

The outstanding feature of these engines is the P&H cylinder head and liner assembly. As shown in the illustration, each cylinder is an independent, fully water-jacketed unit. It can be lifted out of the engine, together with its piston and rod assembly by: (1) disconnecting the injector fuel line and taking out the injector, (2) removing the connecting rod cap through a large inspection port in the crankcase, and (3) removing four head nuts.

Aluminum alloys are used wherever practical to eliminate unnecessary weight, making these engines suitable for mobile and automotive applications. The Model 387-C weighs 1350 lb while the weight of the six-cylinder engine is 1900 lb.

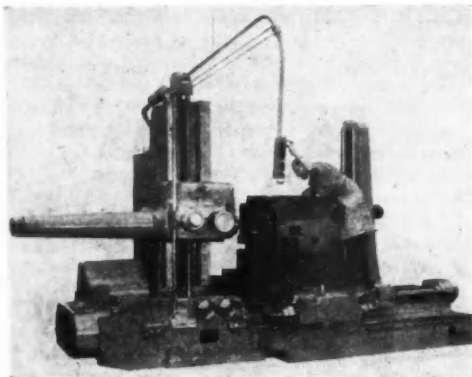
## B-93—Horizontal Boring Mill

Both electrically and mechanically controlled models are provided in the line of precision horizontal boring, drilling and milling machines being built in Cleveland, Ohio, by the Lucas Machine Division of the New Britain Machine Co. Built in 3, 4, 5 and 6 in. spindle sizes, the machines are equipped with automatic power positioning for both table and head. This feature allows the operator, using dial indicators, to accurately repeat on spacing operations, either horizontally or vertically, and to do away with jigs or fixtures.

The machines have a one piece ribbed bed deep box construction extending continuously beneath the column and table with two or four ways for table and saddle support. The ways on the bed, saddle and column of the illustrated model are hard steel inserts, hand fitted and fastened to make them an integral part of the bed or the frame. All other models can be furnished with flame hardened ways. Feeds of the head, the saddle and the table are accomplished by hard surfaced screws. All oiling on the machines is automatic.

The mills have one spindle with both high and low speeds. This spindle is nitrided and also has a nitrided front and rear bushing. On high speed work, the spindle is directly driven by V belts. All vibrations, so fatal to cemented carbide cutters, are dampened by the fly wheel action of the by-passed low speed gears. Pendant control on 3 in. and 4 in. spindle machines start, stop, jog and reverse the spindle rotation. The 4 in. spindle model 460 and 5 in. and 6 in. spindle machines are equipped with pendant directional control for spindle rotation, feed and rapid traverse selection for movement of any unit.

Work ranges of 36 in. by 36 in. to 94 in. by 84 in. are covered by the line. Speeds range from  $7\frac{1}{2}$  to 850 rpm on 5 in. and 6 in. machines, to  $13\frac{1}{2}$  to 1500 rpm on the 3 in. spindle machine.

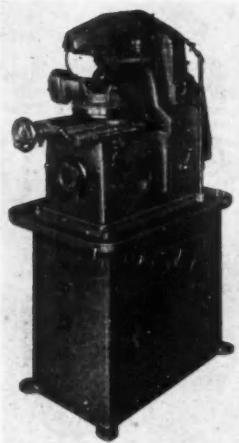


Lucas precision boring mill.



For additional information regarding any of these items, please use coupon on page 56

## B-94—Small-Gear Hobbing Machine



Hamilton No. 1 gear hobber.

Development in the field of precision gear generation is the No. 1 gear hobber of the Hamilton Tool Co., Hamilton, Ohio, which hobs small spur,

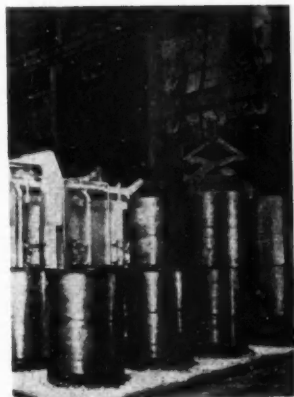
spiral, and bevel gears with high accuracy on fast production schedules, handling work from 0.050 in. to 6 in. O.D. It generates spur gears, spiral gears, bevel gears, worm gears (and worms to 3 thread), splined shafts, gear sectors, and pinions. The hobber delivers twelve hob speeds from 109 rpm to 1259 rpm; provides a hob spindle turntable swivel of 105 deg to the left and 135 deg to the right; affords helix leads from 0.800 in. to 130 in., and operates on a 1 hp motor.

Speed, feed, and indexing can be selected independently, permitting quick selection of speed and feed to suit any material being worked and any size gear being hobbled. Reduction of set-up time far below the considered minimum is said to fit the machine to the job shop as well as to the shop having long runs. Alignment and trueness of work and hob spindles are held to within 0.0002 in.

## B-95—Automatic Coil-Handling Tongs

In cooperation with Heppenstall Co., Pittsburgh, Pa., Ford Motor Co. has installed specially designed automatic tongs for handling cold steel strip and other material handling operations at the River Rouge plant. The special coil handling and annealing cover tongs eliminate need for ground crews to work close to hot annealing ovens.

According to annealing department supervision, the automatic tongs, which require no electricity for holding, are



Heppenstall automatic tongs.

particularly advantageous in positioning one 30,000 lb coil upon another. This must be done cleanly and accurately as rough handling results in damaged coil edges and bent metal must be trimmed off with weight loss. The accuracy of coil handling is predicated on the annealing covers providing only a few inches of space between

the OD of the coils and ID of the cover.

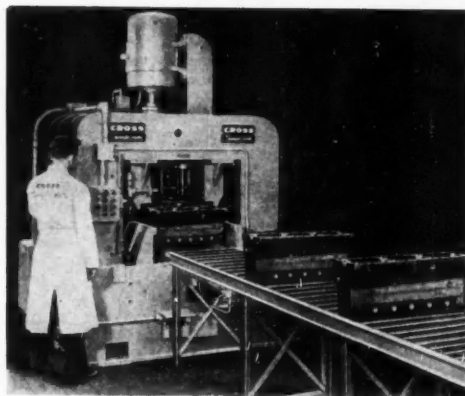
Other Heppenstall tongs were designed for the transportation of various burdens within River Rouge buildings, and for movement of coils and ingots in outside storage.

## B-96—Multi-Spindle Tapping Machine

For tapping cylinder blocks at a greatly reduced cost per piece, a special multiple spindle machine has been delivered by the Cross Co., Detroit, Mich., to a large automotive manufacturer. A Transfer-matic, Cross's name for its

# NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56



Cross multiple spindle machine for tapping cylinder blocks.

line of special machine tools equipped with a continuous automatic material handling device, the new machine taps the pan rail and ends of 130 cylinder blocks per hr at 100 per cent efficiency.

Four stations are provided. The first and fourth are for loading and unloading, respectively. At the second and third stations, 30 holes are tapped in the pan rail, 14 holes in the front face and six holes in the rear face. The operator merely positions the block in the loading station and presses the cycle button. Parts are automatically machined and transferred from station to station.

Features include individual lead screw feed and use of standard Cross sub-assemblies to permit reasonable part design-changes and interchangeability.

## B-97—Surface Grinder For Large Work

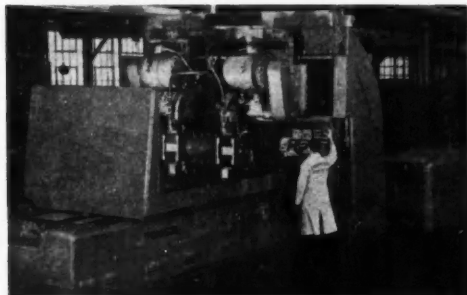
The Thompson Grinder Co. of Springfield, Ohio, entering new fields, announces a complete new line of machines to be known as Hydrail surface grinders, designed to replace many operations formerly done on planers, and at lower cost. With maximum table length to 240 in., the grinders handle large work from rough to finish.

up to 48 in., both vertically and horizontally. The wheel heads, mounted on a massive bridge for rigidity, operate together or independently, either vertically or horizontally, depending on specifications. Particular application in the case illustrated concerns grinding of ware strips in the horn guides of an anti-friction railroad housing. Clearance here is sufficient to grind this housing with the train wheels mounted in position in the housing.

Other Hydrail machines are on the production line for aircraft companies.

Hydrail is furnished with 36 in. and 48 in. vertical heads, and 36 in. and over, horizontal heads. The two wheel

Thompson Hydrail surface grinder for large work from rough to finish.



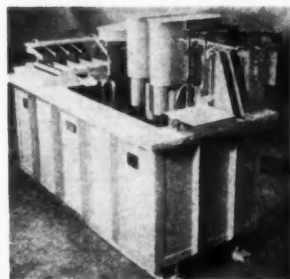
head motors are each 30 hp and 120 rpm. All cycles of operation are completely automatic although hand control is provided. Table speed is adjustable from 10 ft to 100 ft per minute.

The entire hydraulic power unit is enclosed in the tank shown at the far right in the picture. The machine, weighing over 65 tons, is equipped with 13 motors totaling 100 hp. The machine is destined for England.

## B-98—Salt Bath Quench Furnace

Latest design salt bath quenching furnace used in conjunction with the austempering and martempering processes has been brought out by the Ajax Electric Co., Inc., Phila., Pa. This Ajax Isothermal quench furnace assures rapid and uniform cooling of the work by providing a vigorous upward flow of molten salt in headers, into which the hot work is introduced. The salt is circulated by submerged pumps, a separate pump for each header concentrating a great volume of liquid salt into a confined quenching area. Thereby a hardness equal to oil quenching is said to be obtainable together with the martempering and austempering benefits of reduced distortion and elimination of quench cracks.

For removing the chloride contamination a separate steel tank is built into one end of the unit. A motor driven pump lifts the salt from the isothermal quench bath to a trough arranged above the separation tank. This



Ajax isothermal quench furnace.

trough is constantly cooled by a blast of air which chills the salt to the optimum separating temperature which is always well below the operating temperature of the quench bath. The chloride contaminant is precipitated out of solution and collected in wire mesh filter baskets, while the purified nitrate salt—still molten—enters the separation chamber. From there it flows back into the isothermal quench bath, so that the whole cleaning process is on a continuous basis.

### B-99—Second Operation Precision Machine

Model AC59 high speed precision second operation Machine of the Hardinge Bros., Inc., Elmira, N. Y., in-



Hardinge high speed precision second operation machine, model AC 59.

corporates all elements of their present line of second operation machines, with the addition of an air-operated collet feature.

The air-operated collet feature ful-



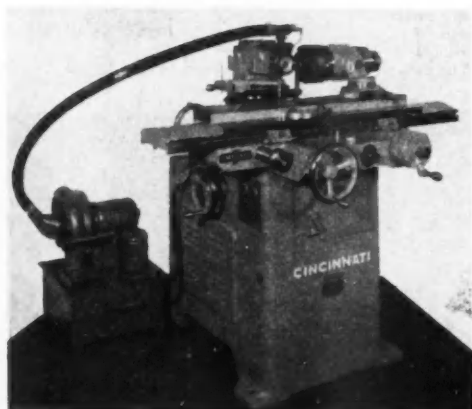
For additional information regarding any of these items, please use coupon on page 56

fills the need for faster operating machines, particularly where machining time is short and the chucking time correspondingly fast. The machine operator closes and opens the collet by simply actuating a foot pedal, as shown. The foot pedal opens and closes an air valve which instantly operates the collet. Foot control of the collet leaves the operator's hands free to do production work of loading and unloading the collet, and feeding the cutting tool slides.

The air-operated collet is said to accurately hold work without distortion even though there is considerable variation in the chucking diameter from one piece of work to another. This fits this second operation machine for machining of automatic screw machine blanked parts, plastic moldings, or die castings. The air-operated collet operates on standard shop air line pressure.

The standard 5C Hardinge collet or step chuck may be instantly closed or opened when the spindle is at rest, or at any speed to 4000 rpm.

The preloaded ball bearing center-drive headstock spindle offers 1 in. round,  $\frac{3}{8}$  in. hexagon, and  $\frac{1}{4}$  in. square collet capacity, with step chuck capacity to 6 in. Eight spindle speeds are available in either forward or reverse direction from 250 to 4000 rpm.



Cincinnati mist type coolant grinding attachment in self-contained unit at left.

### B-100—Mist Type Coolant Unit

A self-contained mist type coolant grinding attachment for their No. 2 cutter and tool grinder is presented by the Cincinnati Milling Machine Co., Cincinnati, Ohio. The equipment, known as the "mist type coolant system for carbide grinding," consists primarily of a floor unit composed of a coolant tank, pump, and suction fan; a large diameter flexible return tube plus a small diameter supply tube to the grinding wheel; and a guard which completely surrounds all but the face of the wheel. (See photo left, below.)

When a thin stream of coolant is directed to the wheel the rapidly rotating wheel transforms the coolant into a fine mist. Instead of the mist being thrown off on the machine, operator and work, however, it is immediately returned via the suction tube to the coolant tank. Thus a small amount of coolant continually circulates on a non-stop round trip.

The mist type coolant grinding attachment is claimed to offer the dual advantages of wet grinding and dry grinding. It can be readily set up and removed when changing from carbide to high speed or carbon steel cutters, and vice versa.

### B-101—Profile Measuring Microscope

A new kind of profile-measuring microscope for high precision measuring and the control of profiles on the basis of enlarged drawings is now available



Hauser profile-measuring microscope P219

for the first time in the United States from Hauser Machine Tool Corp., Manhasset, N. Y., direct and exclusive U. S. Factory Representative of Henri Hauser, Ltd., Bienne, Switzerland.

This instrument accomplishes a com-  
(Turn to page 74, please)



# Squeeze the **DEAD WEIGHT** out of Your Product

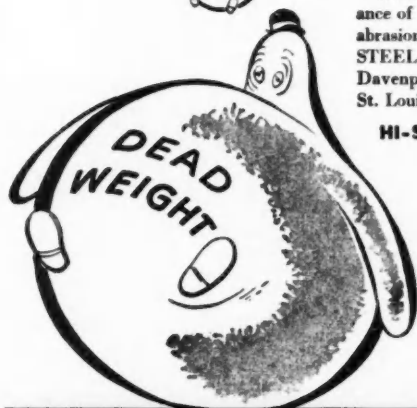
**HI-STEEL reduces weight without sacrificing strength**



By using Inland HI-STEEL instead of ordinary structural-grade carbon steel, you can reduce sectional thicknesses, minimize dead weight, and cut your steel requirements as much as 25% per unit of production. This is possible because HI-STEEL's high strength-to-weight ratio permits the use of much greater unit stress in design ... and has 50% greater ability to stand up under impact loads.

Inland HI-STEEL has about five times the atmospheric corrosion resistance of ordinary structural-grade carbon steel, and is far more resistant to abrasion. It can be easily worked hot or cold. Write for booklet, INLAND STEEL CO., 38 S. Dearborn St., Chicago 3, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

**HI-STEEL meets the requirements of SAE Specification 930.**

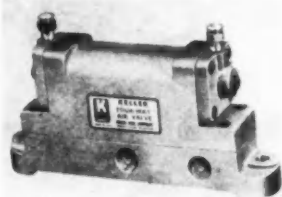


# INLAND HI-STEEL

REG. U. S. PAT. OFF.

**THE LOW ALLOY HIGH-STRENGTH STEEL**

## C-105—Four-Way Air Valve



Keller four-way air valve

A new line of four-way air valves of the balanced-piston type is made available by the Keller Tool Co., Grand Haven, Mich.

The new four-way valves are designed to control double-acting air cylinders in Keller Airfeedrills and for use with other air tools or fixtures requiring fast, accurate control.

The valve is actuated by poppet-type control buttons which exhaust air from either end of a balanced piston. The piston is used only as a means of operating a faced slide valve, which is the actual seal for directional control of the flow of air.

Design features include a slide valve of molded oil-resistant rubber (sealing surfaces said to actually improve with use); a stainless steel, rust-resistant piston for moving the slide valve; packing and lapped fits eliminated to lengthen the unit's service life; pipe connections located in the base so working parts are accessible without disconnecting the air lines.

Keller four-way air valves are available with  $\frac{1}{4}$  in.,  $\frac{1}{2}$  in. and 1 in. pipe threads, with air capacities of 30, 90, and 350 cu ft per minute respectively. They can be bench mounted or mounted as an integral part of a fixture with remote control of operation.

## C-106—Oil Filter For Transmissions

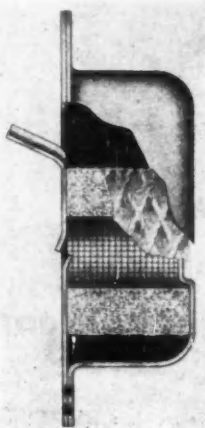
Announced by the Transmission Division of the Fuller Mfg. Co., Kalamazoo, Mich., is a transmission oil filter that continuously cleans gear oil of grit, grime and abrasives during the interval between oil changes. The filter is designed for use on Fuller transmissions, and most other makes as well.

Consisting of a stamped housing with a replaceable filter element, this filter can be attached to all transmissions equipped with standard SAE six bolt short length power take-off openings. The six capscrews used to attach the power take-off cover plate can also be used to attach the new oil filter to the opening.

In operation, transmission oil is forced into the filter housing and through the filter under pressure de-



For additional information please use coupon on page 55



Fuller transmission oil filter.

veloped by the rotation of the transmission gears and shafts. As the oil is forced through the filter, foreign matter suspended in and circulating with the oil is deposited on the replaceable filter element and in the sump at the bottom of the housing. The cleaned oil is then channeled back into the transmission case.

Preferred mounting position is on the right side of the transmission housing where the power take-off opening is standard short-length, six-bolt type. It should be used where the countershaft gears adjacent to the power take-off opening are of sufficient dia to build up the pressure required to force the oil through the filter assembly. When used in this manner, the scoop of the element retaining plate should lie above the horizontal centerline of the assembly. When used over an idling gear, such as constant mesh reverse, the direction of rotation must be considered when determining the location of the scoop.

Fuller engineers recommend the filter element in the new transmission oil filter be changed as often as required by the type of operation. For example: 5000 miles for highway service; every

1000 hrs for logging and associated off-highway operations, and every 500 hrs for dirt moving, mining and associated off-highway operations.

Use of the filter keeps gear oil clean during the interval between changes, but it is not designed to lengthen this interval between changes, the company advises.

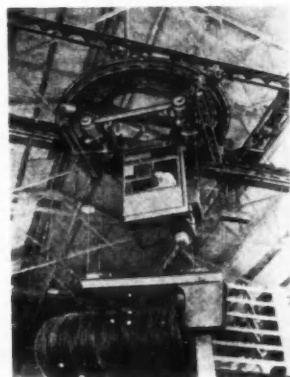
## C-107—Rotating Crane Carrier

A rotating travel motion added to a new carrier, developed by the Cleveland Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has been put into operation on an overhead crane in a large warehouse for handling coiled rod and wire. The handling problem here required not only picking up coils of rod from incoming railroad cars, but also turning them 90 deg when placing into large storage bins. Because of this and the fact that rod is handled by a hairpin-type hook which is tilted either up or down when threading into or drawing away from coils, the following five travel motions were required: (1) hoisting, (2) tilting, (3) trolley travel, (4) bridge travel, and (5) rotation.

The Cleveland Tramrail equipment consists of a crane which travels the length of the storage building, a trolley which travels on the bridge from side to side of the building and a rotating carrier that operates on a circular track built into the trolley. The carrier has two separate hoists, cables from which are reeved to the two ends of the hairpin hook.

All motions of the equipment are controlled by the operator in the cab attached to the carrier. He can run the unit to any point in the building and turn the carrier clockwise or counter-clockwise through short arcs or complete turns, thereby turning the hook to any direction desired. The hook can be raised, lowered, tilted up-

(Turn to page 67, please)



Cleveland Tramrail rotating carrier with hairpin hook.

# 20th CENTURY TREASURE-TROVE



Instead of digging for gold on far-away islands, industrial executives of the 20th Century can find fabulous hidden wealth right in their own production lines.

For many a manufacturer throughout the modern world, Clearing presses have uncovered a buried treasure of reduced production costs. Precision and rigidity of Clearing construction assure maximum productivity. Let us show you how Clearing presses can help you to greater manufacturing profits.

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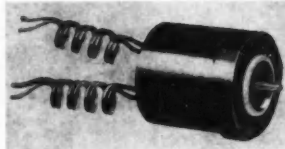
## CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION



## R-16—New A-C Servo Motor

Square D Company's Kollsman Instrument Division, Elmhurst, N. J., has developed a new a.c. servo motor combining high torque, high speed, low inertia, small size and light weight—of special interest to designers of small,



Kollsman A-C servo motor

rapid acting servo systems. The motor is adaptable to high performance servo systems used in military and aircraft computers, radar direction equipment, automatic pilots, searchlight directors, fire control computers and various laboratory equipment.

It is a 400 cycle, 115 volt, two phase, four pole induction motor with a torque of inertia ratio of 26,300 radians/sec./-sec. The motor can reverse fully in two-tenths of a second from 11,200 rpm. It delivers 2½ oz. in. stall torque which varies directly with the control winding voltage. The motor will stop rotating when excitation of the control winding is reduced to zero.

Frame of the motor is fully enclosed. Moreover, the unit is so constructed and lubricated as to insure accurate performance at the extreme temperatures required for military aircraft application.

The motor measures 1¼ in. in dia. by 1¼ in. in length and weighs 6.1 oz.

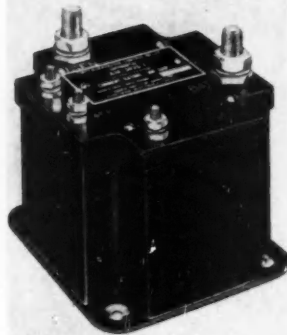
For applications where higher acceleration is more important than small size and light weight, another new Kollsman servo motor has been developed. This, too, is a four pole motor, but its torque to inertia ratio is 46,000 radians/sec./sec., with a stall torque of 3.8 oz in. It is 2.3 in. in dia. by 2 3/16 in. in length and weighs 15 oz. Both motors are made with either plain or pinion shaft.

## R-17—Generator Control Relay

A differential-voltage type generator control relay for aircraft, marine, stationary power plant and other applications is placed on the market by the Hartman Electrical Mfg. Co., Mansfield, Ohio, designed to operate with any d-c generator having maximum capacity of 300 amp and a normal regulated voltage of 28.5 volts. Twelve-volt units are available. This model A-700A is said to completely eliminate current drain when idle, main contact points lasting indefinitely. By closing on the



For additional information please use coupon on page 56



Hartman differential-voltage generator control relay, Model A-700A.

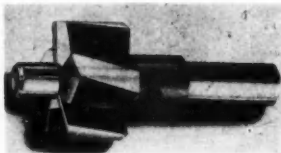
differential voltage between generator and bus, rather than at a fixed voltage, a cutout eliminates flutter on opening. Conforming to Air Force Specification AN-S-42a, the cutout is designed for rated operation from sea level to 50,000 ft at ambient temperatures ranging from -67 F to 160 F. In addition to being used as a reverse current cutout, it can also be used simultaneously as a starting contactor for auxiliary power plants which are started by applying voltage to the generator.

Enclosed in a lightweight aluminum housing which provides mechanical protection and protection against the elements, the relay is moisture, dust and fungus-proof for operation in any climate. The unit occupies a four-in. cube and weighs 2½ lb.

## R-18—New Design Counterbore

Developed by Aircraft Tools, Inc., Los Angeles, Calif., a counterbore of hi-speed steel provides extra heavy tooth construction, extreme shortness (only 2 in. overall length), more flutes for cleaner and smoother cutting, and positive chip clearance. The cutting edge is of sufficient thickness to dissipa-

te heat quickly for faster feeding. For complete flexibility the counterbore, designated AT-488, has interchangeable pilots available in all sizes. It is produced in a complete range of sizes in both straight shank for chucking in drill motors and drill presses, and in tapered shank for use directly in the machine spindle. The new de-



Aircraft new design counterbore.

## R-19—Midget Size Sealed Relay

Designated 637-57A, a hermetically sealed relay provided with standard octal plug having a metal locating pin and glass-to-metal seal on the plug pins is offered by Leach Relay Co., Los Angeles, Calif. This relay combines light weight and midget size with complete protection from atmospheric conditions normally encountered in aircraft, naval installations, mobile equipment, etc. It is said also to have wide use in electronic equipment and special relay applications.



Leach hermetically sealed relay. No. 637-57A.

The relay is equipped with a 235 ohm continuous duty coil and is double pole, double throw having 3/16 in. contacts rated at 10 amp resistive load. It is capable of withstanding 10g vibration, 10g acceleration, and 25g shock, in operations at high altitudes and at high and low temperatures.

# *No Thread Seizure*



## LEAK-PROOF UNIONS THAT DISASSEMBLE EASILY !

Permatex Pipe Joint Compound is a heavy, brushable, ready-to-use product. It flows easily from the brush, spreads evenly over the threads and "stays put".

It forms a flexible film that withstands continual vibration, expansion and contraction without breaking the seal.

The non-hardening properties of Permatex Pipe Joint Compound permit easy adjustment of pipe lines . . . without thread seizure.

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PERMATEX COMPANY, INC.,  
BROOKLYN 29, N. Y.

# PERSONALS

*Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.*

Dodge Div., Chrysler Corp.—**George W. Malcomson** has been made Director of the newly created Used Vehicle Merchandising Dept.

Ford Motor Co.—**William W. Dulmage**, Director of the power department for thirty years, has been appointed power consultant for the company and is succeeded by his son, **Roland W. Dulmage**.

Ford Motor Co.—**Gordon C. Eldredge** has been made Advertising Manager, Ford Div., succeeding **Ben R. Donaldson**, who recently was promoted to Director of Advertising and Sales Promotion. **W. E. Kimbrough** has been made Asst. Manager, Truck and fleet sales dept., succeeding **David W. Lee**, promoted to Director of Sales Planning of the company. **Thomas H. Holden**, Sales Manager, Truck Sales Section, succeeds **Mr. Kimbrough** and **C. E. Bowie**, Manager of the Business Management Dept., who replaces **George J. Crimmins**, promoted to Director of Business Management and Distribution on the staff of **J. R. Davis**, Vice-President, Sales and Advertising.

General Motors Corp., Aero Products Div.—**Max M. Monroe** has been appointed General Manager. He succeeds **W. J. Blanchard**, deceased.

Kaiser-Frazer Corp.—**Theodore V. Houser** and **J. F. Reis** have been elected directors of the company.

Elastic Stop Nut Corp. of America—**Charles E. Heywood** has been appointed Service Engineer for the company.

The Dow Chemical Co.—The announcement of the promotion of **Donald Williams** from General Sales Manager to Director of Sales, succeeding **Leland I. Doan**, has been announced.

Curtiss-Wright Corp.—**Paul V. Shields** has been elected to the newly created office of Chairman, as Chief Executive Officer of the Corporation.

Curtiss-Wright Corp.—**J. F. McCarthy**, Vice-President and Treasurer of the Wright Aeronautical Corp., was elected a Director to fill the vacancy left by the resignation of **W. C. Jordan**.

Westinghouse Electric Corp.—**Thomas L. Holbrook** has been appointed Lamp Sales Engineer.

Consolidated Vultee Aircraft Corp.—Elected to the board of directors were **George H. Howard** of the law firm of Simpson, Thacher and Bartlett and **Sidney G. Down**.

General Petroleum Corp.—**Verne A. Bellman** has been named a Vice-Presi-

dent in charge of marketing and a director. He succeeds **John C. Sample**.

Littelfuse, Inc.—**David Schaible** has been appointed Chief Purchasing Agent.

Tinnerman Products, Inc.—Appointment of **Wendell Garman** as Personnel Manager, has been announced.

L. G. S. Spring Clutch Corp.—The appointment of **Albert F. Korf** as Sales Manager has been announced.

Purolator Products, Inc.—**H. Joseph Markert** has been promoted to Vice-President and Comptroller.

Bound Brook Oil-Less Bearing Co.—The election of **W. R. Toeplitz** and **Samuel S. Connor** to the Board of Directors has been announced.

Worthington Pump and Machinery Corp.—The appointment of **James W. Hepburn** as Asst. Manager of the Vertical Turbine Pump Div., has been announced.

Borg-Warner Corp.—**Hunter Gehlbach** has been appointed Asst. General Counsel of the company.

Monmouth Products Co.—**G. M. Salzman** has been made Executive Vice-President. **Raymond Z. Oswald** has been made Vice-President in charge of Sales and **G. P. Rouge**, Comptroller, assumes the additional duties of Treasurer.

Electric Auto-Lite Co.—**S. L. Ives**, formerly Canadian Advertising Man-

ager, has been transferred to the Toledo office. He replaces **A. A. Ballantyne**, resigned.

General Electric Co.—**Frank C. Neal, Jr.**, has been appointed Manager of the Distribution Sales Div., of the Welding Divisions. **A. T. Davis**, Asst. to the Manager of the Mfg. Industries Div., has retired. He recently completed 42 years' service with the company.

The A. F. Holden Co.—**J. B. Carey**, formerly Sales Manager, has been named Vice-President in charge of Research and Chemical Manufacture. **C. R. Brown** is a Vice-President and **C. R. Hecker** is now Sales Manager and Export Manager.

Hewitt-Robins Incorporated—Hewitt Kestfoam Div.—**John Burkhardt** has been appointed traffic manager of the Div.

The Electric Storage Battery Co.—**Conrad Connell** has been appointed manager, Exide Automotive Battery Replacement Sales Div.

Non-Rust Chemical Corp., Rust Prevention Div. Appointment of **Fred L. Way** as Sales Manager has been announced.

Pennsylvania Salt Manufacturing Co.—**George B. Beitzel** has been elected President of the company. **Leonard T. Beale**, formerly President, will continue as Chairman of the Board.

Norris Stamping and Manufacturing Co.—**H. Ward Butterfield** has been appointed General Manager of Sales.

Standard Tube Co.—**A. R. Schumann** and **L. B. Boensch** have been appointed Sales Engineers specializing in stainless and alloy steel tubular products.

Firestone Steel Products Co.—Assignment of **George B. Moseley** to supervise stamping and contract manufacturing sales has been announced.

The National Screw & Mfg. Co.—Two new appointments, naming **H. Robinson Hyde** as Production Manager, and **Samuel M. Washabaugh**, as Manager of Sales Promotion, have been announced.

The Continental Screw Co.—**Donald H. Sleeper** has been made Asst. Sales Manager.

Surface Combustion Corp.—**Robin A. Bell** has been appointed General Sales Manager of the Janitrol Div.

The Atlantic Refining Co.—Two additional directors were elected to the board as follows: **Dwight T. Colley** and **P. G. Wharton**.

The Magnesium Association—The following officers have been elected for the years 1949 and 1950—**W. A. Winston**, Pres.; **H. B. Megill**, Vice-Pres. and **R. D. Ferguson**, Treasurer.

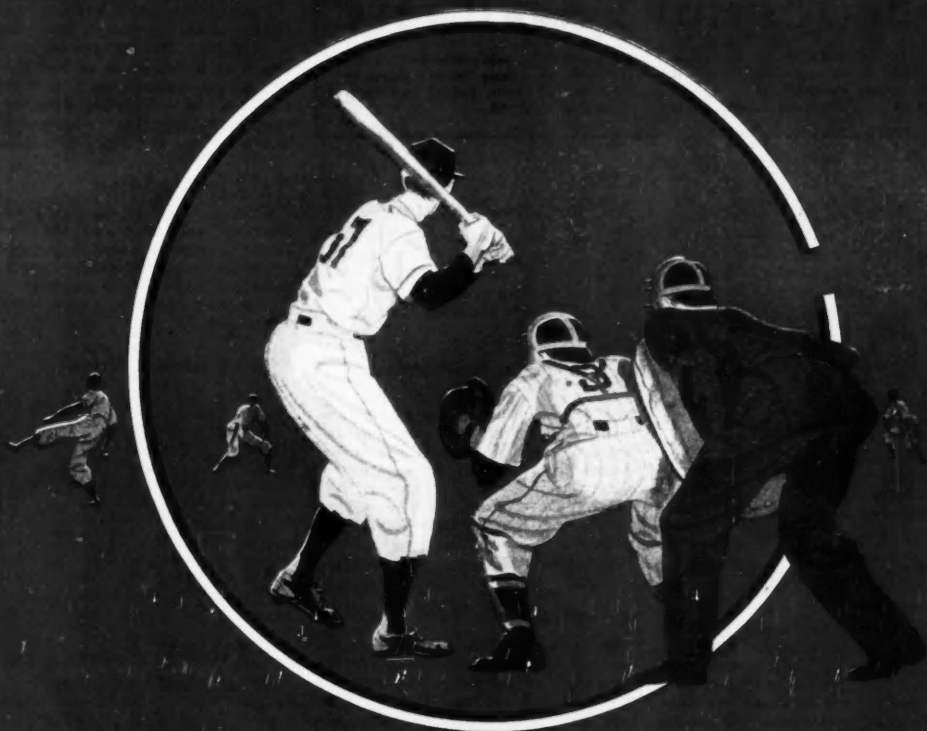
## Necrology

**C. Neal Barney**, 73, vice president, secretary and general counsel of Worthington Pump and Machinery Corp., died in Scarsdale, N. Y., on April 24.

**Ira Hand**, 69, general manager of the National Motor Boat Show and secretary of the National Association of Engine and Boat Manufacturers, died April 26 in Sarasota, Fla.

**William P. Brown**, 52, retired president of the Briggs Manufacturing Co. died April 25 in Nassau, Bahamas.

**Frank J. Timmens**, 54, former general sales manager of Chrysler Corp.'s Dodge Div. died May 1 in Watsonville, Calif.



*You throw 'em - we catch 'em*

Since 1911, when Sealed Power joined your team, you have thrown us a lot of fast balls and some mighty perplexing curves. We're proud of the fact that we've caught 'em all. It is a privilege to help you keep the customers happy—even during the trying scramble of war years. Your close co-operation has brought Sealed Power facilities to an all-time peak of excellence.

You are urged to use all our resources to help make your good engines even better.

**SEALED POWER CORPORATION**  
MUSKOGEE, MICHIGAN



**Sealed Power**

**PISTON RINGS · PISTONS  
CYLINDER SLEEVES**

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Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### A-146 Mack Diesel Engines

Mack Trucks, Inc.—A new illustrated catalog features Mack Trucks' newly designed 4-cycle, 6-cyl. 150 hp Diesel engine. In easily understood text, accompanied by drawings and photographs, the catalog presents the new engine in non-technical manner, describing the advantages of automatic timing, controlled combustion and controlled fuel distribution. Another book by Mack is entitled Understanding the Automotive Diesel. It gives a brief history of the diesel engine and its contrasts with other forms of engines. Diesel fuels, various combustion systems, two and four-stroke engines, fuel injection, etc., are discussed.

### A-147 Testing Machine Accessories

The Baldwin Locomotive Works—Bulletin 261-A describes and illustrates the supplementary devices which are used to adapt testing machines to a wide scope of testing conditions. More than 30 illustrations show this equipment and how it is used.

### A-148 Hydraulic Presses

The Baldwin Locomotive Works—A new 12-page bulletin, No. 285, illustrates nearly forty hydraulic presses used for forming and drawing, forging, extrusion, plate working, bending, etc.

### A-149 Finishes for Aluminum

Reynolds Metals Co.—A new 124-page book, Finishes for Aluminum, furnishes basic information on the various processes for applying surface finishes to aluminum, as well as the characteristics of the finishes so produced. The booklet may be had by writing, on your company letterhead, to Reynolds Metals Co., 2500 S. Third Street, Louisville 1, Ky.

### A-150 Relays

Ebert Engineering & Mfg. Co. — A new booklet is available concerning the company's redesigned and improved line of Mercury relays. Outline drawings, photographs and technical data are shown in detail.

### A-151 Burs and Accessories

Pratt & Whitney—A newly revised edition of the company's Bur Catalog is available. The information on Carbide Burs is completely revised and enlarged and contains much new information. The new Di-Bur, designed for use on die steels, is described and illustrated.

### A-152 Syncro Timers

Pratt & Whitney—A new circular describes and illustrates the Syncro Timer, a remote control timing device, that will direct or classify or sort almost anything that is produced continuously or that travels on a conveyor mechanism.

### A-153 Hydraulic Valves

Gerotor May Corp.—A new 2-color, 52-page catalog illustrates and describes the entire line of Gerotor 4-way Hydraulic Valves. Description of each model valve includes working drawings, specifications for sizes, cut-away views and operational diagrams of piston designs. The new catalog fully describes 25 models of oil pilot valves for remote control of main 4-way valves. Also shown are valves for flow control, shut-off and deceleration, sequence, counter-balance, etc.

### A-154 Testing Machines

Tinius Olsen Testing Machine Co.—Bulletin No. 39 covers the complete line of Olsen hand operated, motor driven and automatic ductility testing

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# Close tolerances in resilient gaskets are seldom necessary

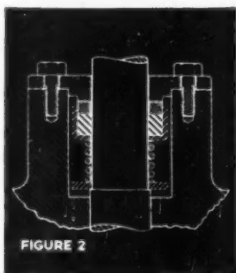


FIGURE 2

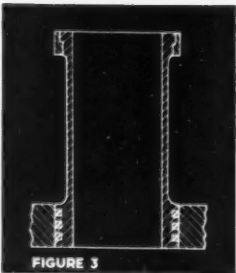


FIGURE 3

Close tolerances in resilient gaskets are a luxury that is seldom justified. Even units with extremely close assembly tolerances can usually be sealed with gaskets made to commercial standards . . . provided the design of the unit and the choice of gasket material are in harmony.

In figure 1, for example, close assembly tolerances can be maintained. Yet the gasket can vary over a relatively wide range of thicknesses if it has been cut from a truly compressible material like Armstrong's cork-and-rubber. Because these materials decrease in volume under load, they compensate for tolerance variation.

When rubber was used as a packing ring in figure 2, close tolerances were necessary to prevent high radial pressure. A factory-lubricated cork-and-rubber ring was substituted. Made slightly undersize to insure a tight seal, cork-and-rubber compresses enough to maintain low radial pressure.

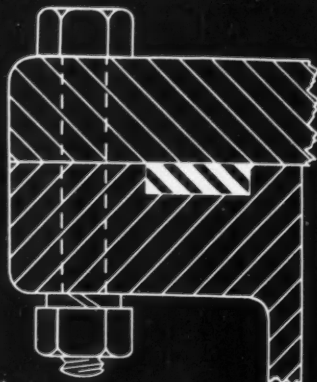


FIGURE 1

To seal the cylinder liner in figure 3 with molded rubber rings, extremely close tolerances were required. Undersize rings leaked. Oversize rings tended to split the sleeve. A slightly oversize cork-and-rubber ring was tried. Fitting snugly into the groove, it sealed tightly. And there was no danger of splitting the sleeve.

Available in 17 different formulations, Armstrong's cork-and-rubber combines truly compressible cork particles and non-compressible synthetic rubbers in a wide range of compressibilities. To suit particular sealing requirements, these gasket materials may be used with compressions ranging from 10% to 50%.

Versatile cork-and-rubber can help solve your sealing problems. We recommend that you discuss your application with an Armstrong representative. He can suggest suitable materials and supply samples for experimental use.



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You'll find useful application and specification data in the new, enlarged 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date data on synthetic rubber, cork-and-synthetic-rubber, cork composition, and fiber sheet sealing materials.

This booklet includes ten technical discussions of the factors influencing

modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries. Also included are typical applications and current government specifications.

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machines. In addition the catalog includes sections on tools for ductility testing using Universal Testing Machines, the Dynamic Olsen-Williams Ductility Machine and complete instructions on the installation, maintenance and operation of all Olsen ductility testing equipment.

#### A-155 Nitralloy Steel

Joseph T. Ryerson & Son, Inc. — A new 8-page engineering data bulletin describes Nitralloy, a special alloy steel suitable for extreme wear and abrasion resistance. Included is a table of Nitralloy compositions, hardness curves,

mechanical properties, information on nitriding and heat treatment and typical applications.

#### A-156 Carbide Tools

Wiley's Carbide Tool Co.—Catalog No. 449 illustrates and prices standard items, and shows many typical applications of special tools. Catalog numbers and sizes conform to the new industry standards now in effect on standard cutting tools and bits.

#### A-157 Utility Bodies

Morrison Steel Products, Inc. — A

four-page bulletin illustrates and describes the new Morrison Carry-All, all-steel, all-purpose service and utility body. It pictures various ways by which the Carry-All with the addition of one of several pieces of optional equipment, may be adapted to serve the needs of most light industries.

#### A-158 Synchronous Motors

Allis-Chalmers Mfg. Co.—Operating advantages and construction features of the company's bracket bearing synchronous motors in sizes from 30 to 1000 hp are described in a new 16-page bulletin.

#### A-159 V-Belts

The B. F. Goodrich Co.—A new catalog section on its light-duty V belts has been released. A feature of the new catalog section is a warehouse stock list of new standard numbers. It also describes in detail the construction of the company's V belts, tells of the advantages in using rayon cord and other design features.

#### Bell Aircraft Has Backlog of \$30 Million

Most of the Bell Aircraft Corp.'s backlog now is Government work, and total unfilled orders have jumped nearly 100 per cent in the last year to \$30 million, Lawrence D. Bell, president, said in the annual report. Mr. Bell said that the backlog includes research, development and production contracts for guided missiles, guided bombs and rocket engines as well as development and production of X-1A and (two) X-2 supersonic airplanes, military helicopter contracts, and subcontracts totaling almost \$8 million for B-47 jet bomber power packs and tail surfaces.

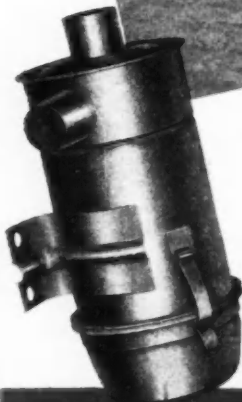
### BOOKS . . .

ELEMENTS OF MECHANICAL VIBRATION—Second Edition—by C. R. Freberg and Emory N. Kemler, pub.: John Wiley & Sons, Inc. Like the first edition, the new text is intended for students and engineers alike, laying particular stress on the simple treatment of problems, and emphasizing the many problems which can be solved by using the simpler forms of differential equations and approximate methods. The second edition also introduces the mobility method for determining the behavior of systems of several degrees of freedom. The most important feature of the new edition is the inclusion of two new chapters—one on sound and its engineering applications; the other on beams. Naturally, the publication of a new text has provided the opportunity to make changes and additions.

A listing of chapter headings will give the student a better visualization of the scope of the book. These are as follows: vibrations without damping; damped vibrations; vibration of systems with several degrees of freedom; vibration isolation; equivalent systems; beams; sound; the mobility method; mechanical and electrical analogies.

KEEPING ABREAST OF POWER PROGRESS . . . . .

## New ALLIS-CHALMERS Model "G" Tractors are equipped with DONALDSON AIR CLEANERS



A rear-mounted engine, unobstructed visibility forward, and a complete range of tractor-mounted tools give the new A-C model "G" startling appearance and performance.

As on many other models in this famous line of farm tractors, Donaldson Oil-Washed Air Cleaners were chosen as standard equipment.

New developments in power machinery often present new problems in dust protection. Donaldson research, engineering and testing facilities are available to all manufacturers in solving these problems.

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**DONALDSON**  
*Oil-Washed*  
**AIR CLEANERS**

WRITE FOR INFORMATION OR ENGINEERING SERVICE

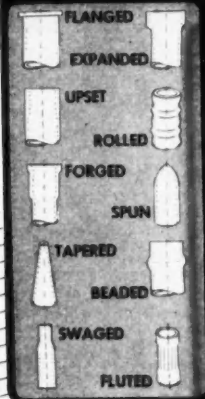
# Michigan WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tubing  
Straight or Fabricated to your specification  
**ROUND SQUARE-RECTANGULAR**  
1/2" to 4" O.D. 1/16" to 22 gauge 14" to 72" gauge 20 gauge 1" to 72" 14, 16, 18 gauge

## Standard Sizes

Tube Diameter O.D. Size	Maximum Wall BWG Gauge	Minimum Wall BWG Gauge
1/8"	.049	22
1/4"	.063	24
3/8"	.083	24
1/2"	.095	24
5/8"	.095	24
3/4"	.095	24
7/8"	.095	22
1"	.095	22
1 1/8"	.095	22
1 1/4"	.095	20
1 3/8"	.095	20
1 1/2"	.120	20
1 3/4"	.120	20
2"	.148	20
2 1/8"	.148	20
2 1/4"	.148	20
2 3/8"	.148	20
2 1/2"	.148	20
2 3/4"	.148	20
3"	.148	20
3 1/8"	.148	18
3 1/4"	.148	18
3 3/8"	.148	18
3 1/2"	.148	16
3 3/4"	.148	16
4"	.148	16

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# Knock-Free Diesel Operation

(Continued from page 46)

A special injector nozzle provides proper atomization of the fuel and prevents "after-dribble." It is designed so that its closing pressure is higher than its opening pressure, thus giving a sharp cut-off at the end of injection.

The nozzle has two annular spaces in which fuel pressure can act upon the needle in the opening direction. Small non-return valves separate the lower space from the delivery pipe. These valves are spring loaded toward the

upper annular space to prevent combustion pressure from pushing fuel in the nozzles back into the delivery pipe at the end of injection.

In operation, fuel passes directly into the upper annular space and past the non-return valves to the lower space, thus acting in an opening direction in both annular spaces. The injector is set to open at 70 to 75 atmospheres.

At the end of injection the fuel pressure falls suddenly and the non-return

valve in the injector closes rapidly, leaving the injector spring to overcome the pressure from only one of the annular spaces. This makes it possible for the spring to close the needle valve against a much higher fuel pressure than that required to open the valve.

A special type of delivery valve meters fuel back into the pump and controls the unloading of the pipe line to prevent disturbance of injection to other cylinders or dribble at the injector nozzle.

## CALENDAR

### Conventions and Meetings

- Soc. for Experimental Stress Analysis Mtg., Detroit ..... May 19-21
- Auto. Eng. Rebuilders Assoc. Annual Convention, Baltimore, Md. .... May 19-21
- Paris Fair, Paris, France .... May 21-June 6
- Natl. Std. Parts Assn., Regional Business Mtg., Philadelphia ..... May 22
- Middle Atlantic Regional Automotive Show, Phila. .... May 23-30
- Assoc. of Amer. Battery Mfrs., Spring Mtg., French Lick Springs .... May 25-27
- Canadian Int. Fair, Toronto, May 30-June 10
- SAE Summer Mtg., French Lick, June 5-16
- Phila. Auto Trade Assoc. Show, Phila. .... June 11-18
- Nat'l Truck, Trailer & Equip. Show, Los Angeles .... June 15-18
- ASME Conference Applied Mechanics, Ann Arbor .... June 13-15
- American Inst. of Elec. Engineers, Swampscott, Mass. .... June 20-24
- Amer. Soc. for Testing Materials Annual Mtg., Atlantic City, June 27-July 1
- Amer. Electroplaters' Soc. Annual Convention, Milwaukee .... June 27-30
- SAE West Coast Mtg., Portland, Aug. 15-17
- Conf. on Road & Motor Transportation, Geneva .... Aug. 23
- Canadian Nat'l Aircraft Exhibition, Toronto .... Aug. 26-Sept. 10
- Nat'l Air Races, Cleveland ..... Sept. 3-4-5
- Instrument Soc. of America Convention, St. Louis .... Sept. 12-16
- Inst. of Traffic Engineers, Washington, D. C. .... Sept. 25-28
- British Passenger Car Show, London, Sept. 23-Oct. 8
- Society of Industrial Packaging and Materials Handling Engineers Annual Exposition, Detroit .... Oct. 4-7
- Nat'l Safety Council Safety Congress & Exhibit, Chicago .... Oct. 24-28
- Chicago Auto Show, Chicago .... Nov. 4-12

Compactness, Low Weight for  
America's *Finest* Products

**Lamb Electric**  
**MOTORS**

Your new or redesigned product can be given these important advantages by using a Lamb Electric Motor because:

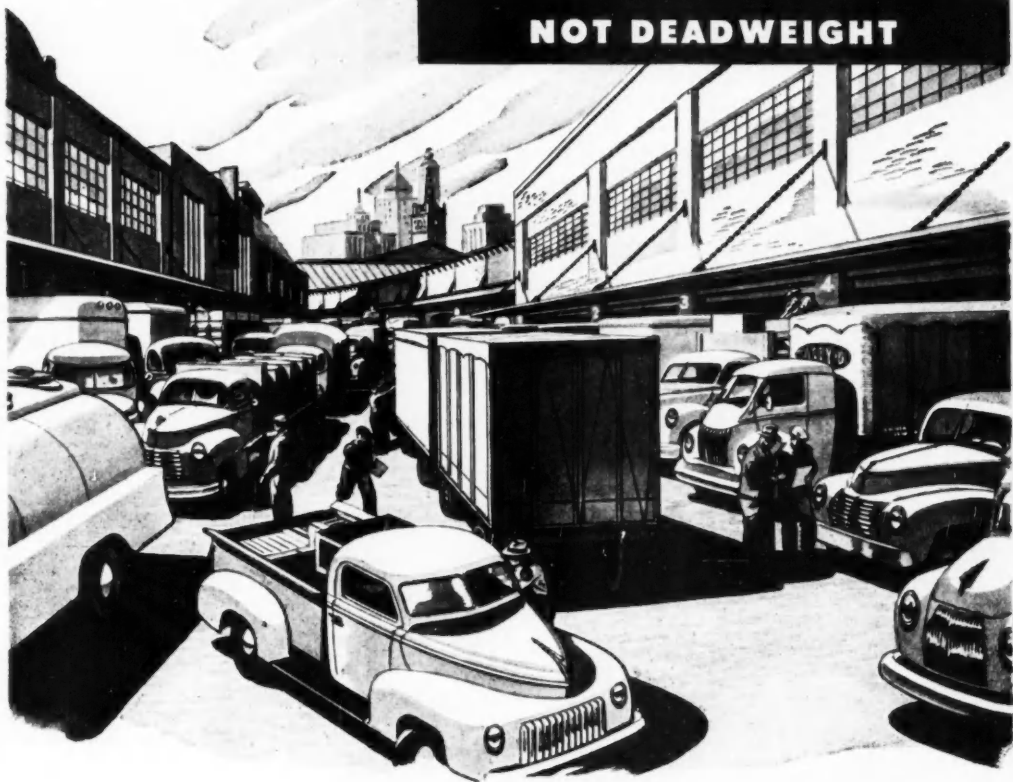
1. Every motor is engineered for a particular application.
2. 34 years' experience in motor engineering has taught us where and how much weight can be reduced without interfering with essential electrical characteristics.
3. This experience frequently enables us to make product design suggestions which reduce product weight, provide compactness, improve performance and lower cost.

To obtain these, and other benefits of special application, be sure to consider the motor in the early stages of product development.

THE LAMB ELECTRIC COMPANY  
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**Lamb Electric**  
SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER **MOTORS**

## BUILT TO MOVE GOODS— NOT DEADWEIGHT



The weight's in the load and not in the truck when frames, body panels, fenders, wheels and other truck structural parts are made of N-A-X HIGH-TENSILE. And while affording weight savings of up to 25% in section, the high physical properties of N-A-X HIGH-TENSILE insure superior strength and increased resistance to fatigue, corrosion, abrasion and denting.

This decrease in deadweight decreases on-the-job expenses, too. Trucks built with N-A-X HIGH-TENSILE consume less gasoline . . . require less maintenance . . . give longer service. And the excellent formability, weldability, and fine surface texture of N-A-X HIGH-TENSILE mean that you build them better, with no added fabricating problems.



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## Business in Brief

Written by the Guaranty Trust Co.,  
New York, Exclusively for AUTO-  
MOTIVE INDUSTRIES.

Business activity in general registered a slight decline during the week ended April 23. Department store sales, railway freight loadings, crude oil output and construction were higher than in the preceding week, while electric power production and bituminous coal production decreased. The *New York Times* index of activity for the week ended April 23 stands at 145.3, as compared with 146.7 in the preceding week and 146.3 a year ago.

Sales of department stores during the week ended April 23, as reported by the Federal Reserve Board, equaled 296 per cent of the 1935-39 average, as compared with 294 in the week before. Sales were 10 per cent below the corresponding distribution a year ago, as against a preceding increase of seven per cent. The total in 1948 so far reported is three per cent less than the comparable sum in 1948.

Electric power production declined more than seasonally during the week ended April 23. The output was 5.9 per cent above the corresponding amount in 1948, as compared with a similar advance of 5.0 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 769,336 cars, 0.4 per cent more than the figure for the week before but 9.7 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended April 23 averaged 4,915,950 bbl daily, 1350 bbl more than in the preceding week but 501,450 bbl below the comparable output in 1948.

Production of bituminous coal and lignite during the same week is estimated at 11,355,000 net tons, 9.8 per cent less than the output in the week before and 2.0 per cent below the corresponding quantity in 1948.

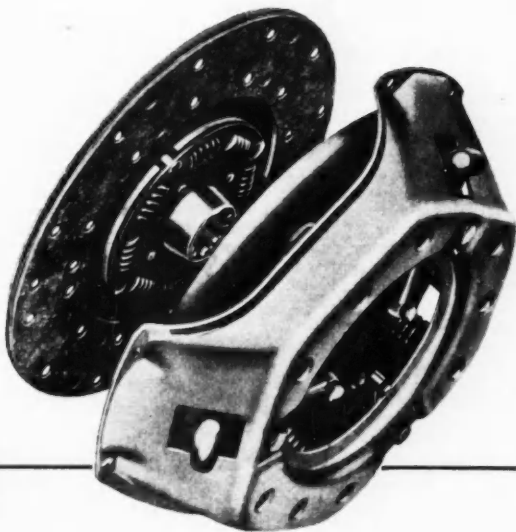
Civil engineering construction volume reported for the week ended April 28, according to *Engineering News-Record*, was \$145,936,000, or 36 per cent more than the preceding weekly figure but 20 per cent below the comparable sum in 1948. The total recorded for 17 weeks of this year was 18 per cent more than the corresponding amount in 1948. Private construction for the period was 24 per cent above that a year ago, and public construction increased by 14 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended April 26, at 156.1 per cent of the 1926 average, was 0.5 per cent less than in the preceding week and 4.5 per cent below the corresponding figure in 1948. The decline in the general index reflected price reductions in farm products, foods, metals and metal products.

Member bank reserve balances decreased \$375 million during the week ended April 27. Underlying changes thus reflected include a decline of \$345 million in Reserve bank credit and an increase of \$92 million in Treasury deposits with Federal Reserve banks, accompanied by decreases of \$52 million in money in circulation and \$5 million in Treasury cash.

Total loans and investments of reporting member banks increased \$171 million during the week ended April 26. A decline of \$243 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$14,300 million, shows a net increase of \$2 million in 12 months.

In stop-and-go traffic driving, Long clutches give smooth, positive, effortless performance. At highway speeds, the semi-centrifugal construction means increased torque capacity—less slippage, less wear. They have equipped millions of cars, trucks, buses and tractors since 1922.



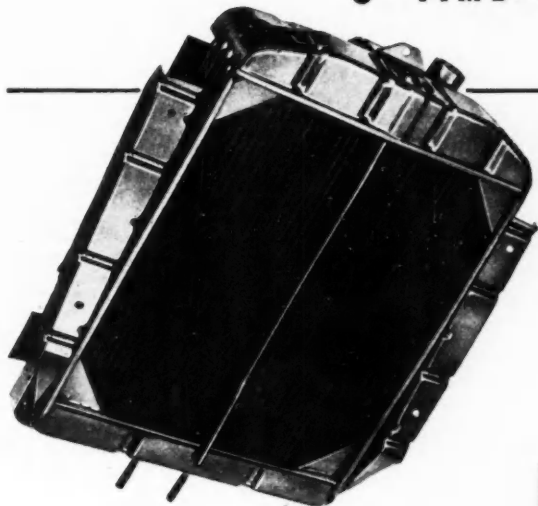
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## *Clutches and Radiators*

- EFFICIENT ENGINEERING
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Long radiators have been used throughout the automotive world since 1903. Fin-and-tube design and construction provide clean, unobstructed water courses . . . maximum heat exchange. In heavy-duty commercial engines or high-speed passenger cars, this means engines that run cool.



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BORG-WARNER CORPORATION  
Detroit 12 and Windsor, Ontario

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# LONG

CLUTCHES • RADIATORS • OIL COOLERS

## Fuel-Spray Nozzles for Aircraft Gas Turbines

(Continued from page 33)

a high rotational velocity in the swirl chamber at low flows, this being essential to a good spray.

When increased nozzle discharge is required the pressure of the fuel supply is raised and flow into both sets of inlet holes occurs. The cutting off of the large inlet holes is accomplished by the fuel divider or splitter valve shown. It is merely a spring-loaded throttling

valve which controls the flow to the large slots. This valve is commonly set to cause a throttling pressure loss of approximately 30 psi. With this setting, until the supply pressure exceeds 30 psi all flow will be through the small slots. At higher supply pressures, the division of flow is influenced by the divider and the ratio of areas of the large and small slots. It is character-

istic of the duplex nozzle that the spray angle decreases as the large slots become effective. Consideration of equation (1) and the discussion of the effect of change in the value of "M" give the reasons for this. This change in spray angle can be made smaller if the small slots enter the swirl chamber at smaller radius than the large set of holes, as shown on the sketch. Duplex nozzles have been used in furnace practice which have the fuel divider element within the nozzle body. In these, the cut-off and throttling to one or more sets of holes has commonly been accomplished by spring-loaded balls in the fuel passages.

### Bibliography

1. The Design of Constant and Variable Capacity Mechanical Oil Atomizers, by Harvey and Hermandorfer, Soc. of Naval Architects and Marine Engineers, Trans. V, 51, 1943, pp. 61-77, Disc. 78-82.
  2. Fuel Systems for the Aero-gas Turbine, by E. A. Watson, The Engineer, September, 1948.
  3. Thesis of J. P. Longwell, Massachusetts Institute of Technology, "Atomization of Oil."
  4. Atomization of Oil by Small Pressure-Atomizing Nozzles, by Glendenning, Black, Ventres and Sullivan, ASME Trans. Vol. 61, July 1939, pp. 373-381.
- (Part two of this article by J. A. Bolt and M. F. Saxton will appear in an early issue of AUTOMOTIVE INDUSTRIES.)

## Army to Spend Over \$83 Million

(Continued from page 36)

system coated and flanged for ease of maintenance and waterproofing, \$20; new radiator, \$10; new tires, \$25; divided wheels, \$75; extra tools, \$10; modifying front end, including windshield, \$60; body modification, eliminate tail gate, provide underbody clearance for wheel change, brackets for tooling mounting, grille change, \$50; trailer electrical coupling receptacle, \$5; hood change to provide for deep-water fording and kit receptacle, \$10; and new top fastening, \$5; making the total cost of additions \$823.14.

This brings the total to approximately \$2000. Ordnance figures spare parts at 25 per cent of original procurement, which means an additional \$500 for this purpose, bringing the total to \$2500. Congress maintains that need for all of these gadgets and parts is not apparent and ordered Ordnance to cut down on these items.

### Israel Gets \$6 Million Loan for U. S. Vehicles

The board of directors of the Import-Export bank have approved a \$6 million loan for the State of Israel for trucks and buses to be purchased from U. S. manufacturers. The orders will be for chassis only with bodies to be built in Palestine. The loan is said to represent only about 10 per cent of truck and bus requirements for Israel for the next ten years.



## When human lives are at stake . . . KOPP GLASS SERVES!

For ambulances, fire trucks and similar vehicles, the very best warning and signal lighting equipment is absolutely imperative! The extensive use of Kopp glass for this service is evidence of the high quality of Kopp lenses.

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Kopp lenses may be secured from leading makers of vehicle signal equipment.



Kopp Stop lenses for commercial vehicles are made in a variety of colors and styles.



Kopp Directional Arrows are made in all desired colors and meet your directed standards.



Plain red lenses for ambulances and fire trucks give a strong, clear warning signal.

## KOPP GLASS, INC.



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for over-the-road hauling

*Superior  
Stainless  
Days!*

great durability

high strength

fine appearance

low maintenance

Stainless steel is the top metal for modern body builders. Stainless is strong, tough and durable, affords better protection for the load and lower maintenance cost. Stainless is bright and stays bright.

SUPERIOR high tensile stainless strip steel provides the greatest strength with the lightest weight. Use SUPERIOR Stainless for more pay load on the road.

**Superior Steel**

CORPORATION



**Superior**  
*Stainless strip  
steel*

# 11 important industries that benefit from HYCAR

**SUGGESTED USES FOR HYCAR**

APPLICATION	Automotive	Aviation	Chemical	Food	General	Machinery	Marine	Petroleum	Printing	Railway	Textile
Abrasive Wheels and Points	x	x									
Artificial Leather	x	x									
Brake Expanders and Liners	x	x									
Cements and Adhesives	x	x									
Coated and Impregnated Fabric	x	x									
Coated and Impregnated Paper	x	x									
Conveyor Belts	x	x									
Diaphragms, Valve and Regulator	x	x									
Electric Cable Jackets	x	x									
Flexible Couplings	x	x									
Fuel Cells and De-icers	x	x									
Gaskets, Packings, Seals	x	x									
Hard Rubber Products	x	x									
Heels and Soles	x	x									
Hose, Coolant and Water	x	x									
Hose, Hydraulic Fluid	x	x									
Hose, Oil and Gasoline	x	x									
Household and Kitchen Articles	x	x									
Industrial Gloves and Clothing	x	x									
Line Supports and Grammets	x	x									
Mats and Flooring	x	x									
Mountings and Bushings	x	x									
Press and Die Pads	x	x									
Printing Blankets	x	x									
Rubber Rollers	x	x									
Sealing Strips	x	x									
Sponge Rubber Products	x	x									
Textile Cots, Combs, etc.	x	x									
Transmission Belts	x	x									
Vibration Damping Equipment	x	x									

## Does this quick check list give you an idea?

THAT chart lists 30 groups of items that can be made from Hycar American rubbers, and shows 11 broad industrial classifications where these Hycar parts can be used advantageously. The chart is taken from the up-to-date Hycar booklet, "Everywhere in Industry," which describes Hycar's characteristics with full technical data. A FREE copy is yours for the asking.

But at best the list is an incomplete one that can only suggest applications for Hycar in your own business. Hycar's usefulness is so wide and its versatility so great that scores and hundreds of important applications have not yet even been thought of!

That's why we suggest that you carefully examine the list of Hycar's inherent properties shown in the box at the right. Keep in mind the require-

ments of your rubber parts. And remember that it's possible to select exactly the right combination of properties to meet your established service conditions. Then—ask your supplier for parts made from Hycar for test in your own applications—difficult or routine.

You'll find that the use of Hycar parts will save you money—that it's wise to use Hycar for long-time dependable performance. For more information, please write Dept. HC-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

**Hycar**  
Reg. U. S. Pat. Off.  
American Rubber

### CHECK THESE SUPERIOR FEATURES OF HYCAR

1. EXTREME OIL RESISTANCE—insuring dimensional stability of parts.
2. HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.
3. ABRASION RESISTANCE—50% greater than natural rubber.
4. MINIMUM COLD FLOW—even at elevated temperatures.
5. LOW TEMPERATURE FLEXIBILITY—down to -65° F.
6. LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.
7. AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.
8. HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.
9. NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

**B. F. Goodrich Chemical Company**

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

A DIVISION OF  
THE B. F. GOODRICH COMPANY

## NEW PRODUCTS

For additional information please use coupon on page 56

(Continued from page 50)

wards or downwards by separate or simultaneous operation of the hoists for utmost handling flexibility.

Speeds of this equipment are: bridge 400 FPM, trolley 200 FPM, hoist 50 to 80 FPM, and rotation 75 FPM. Bridge and trolley control are variable five-speed magnetic with dynamic braking. Hoist control is variable-speed drum type with dynamic lowering. Rotating control is automatic accelerating.

The cab is open-type with landing platform and has glass and grating in the floor. A safety switch in the cab can stop all motions in emergency. Motor-driven horn and flood light are provided. The unit was designed to carry 3500 lb of rod in addition to weight of the hairpin hook.

### C-108—Power Tool Torque Analyzer

An analyzer believed to be the first and only for accurately checking the tightening capacity, range and adjustment of powered torque tools in mass assembly operations is being placed on



Livermont analyzer for powered torque tools.

the market by Richmond, Inc., Los Angeles, Calif. The analyzer is designed to overcome variable line assemblage inevitable when power tightening of nuts, bolts and screws is left to the discretion of the individual worker.

Used on direct drives of powered torque tools this Livermont analyzer demonstrates the torque at which the clutch releases and at what rate torque increase is accomplished beyond the

releasing point if held into engagement. Used on cushion clutch drives it shows at what torque the clutch releases and begins to impact, the rate torque is gained after impact starts, and the ultimate torque capacity of the tool. Used on pure impact drives, it reveals the power delivering capacity of the impact (whether air or electric driven), the time required to reach a certain torque, and again, the ultimate torque capacity of the tool.

On a direct reading scale the analyzer also gives the high rpm of kinetic energy tools which deliver their ultimate with the first cycle and a lesser amount of torque on subsequent

cycles unless the tool is permitted time enough to return to full maximum rpm.

A master torque wrench is furnished with each unit so that accuracy can be checked periodically. The machine can be reset in a matter of minutes, eliminating necessity of returning the unit to the manufacturer for recalibration. No power connection is required, the device being entirely mechanical.

The analyzer is mounted on a portable stand equipped with 2½ in. casters. Overall height is 3 ft 6 in.; length, 2 ft 2 in.; width, 1 ft 8 in.; and weight, 195 lb uncrated.

(Turn to page 68, please)

*You can depend on—*  
**BORG & BECK**  
 FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD!

**Engineered by Borg & Beck**  
 means... expertly designed and precision built  
 by clutch-making SPECIALISTS!

**BORG & BECK DIVISION**

**BORG-WARNER CORPORATION**

**CHICAGO 38, ILLINOIS**



## To help with your finishing problems

Binks engineers have designed, built and installed complete finishing systems for most of the nation's leading automotive industries. Over a long period of years these men have acquired valuable experience that is available to you, without cost or obligation. No matter where you are located, they will be glad to help you solve troublesome spray finishing problems, advise and assist in making present systems more efficient or consult with you about new equipment, handling methods and systems.

### Binks automotive spray finishing equipment gives you these important benefits:

- **Lower costs** through faster, better finishing.
- **A single source for everything** required for spray finishing... from spray booths to hose connections.
- **Broad experience** in the design of equipment for the automobile, truck and bus industries.
- **Specialized equipment** for the particular needs of the automotive industry is part of Binks standard line.
- **Engineering and technical** service and consultation on any problem of finish or equipment is yours for the asking.
- **Immediate delivery** on standard equipment, such as spray guns, material tanks, etc.

"We always welcome and appreciate the opportunity of demonstrating—to your satisfaction—that you can produce better finishes at lower cost."

*J. P. Roche*  
President

# Binks

MANUFACTURING COMPANY

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for free copy of our new Catalog Data Book. Request your copy on your company letterhead.

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 ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

## NEW PRODUCTS

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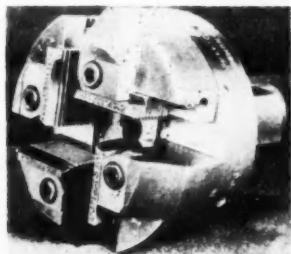
(Continued from page 67)

### C-109—Spray Booth Wash Compound

A water wash compound for paint spray booths that lubricates the overspray is being manufactured by Northwest Chemical Co., Detroit, Mich., and identified as Northwest Number One. In contrast to other products for this purpose that break down the paints, Number One coats each particle of paint with a non-volatile solvent. Any overspray so lubricated will not stick to the back curtain or any of the eliminators. The booth keeps clean and the sludge remains floating for easy skimming. The manufacturer claims Number One eliminates down-time for booth cleaning and baffle stripping, and enables operators to work under conditions of clean fresh air at all times.

### C-110—Solid Adjustable Die Heads

Solid adjustable die heads,  $\frac{1}{2}$  in. and  $\frac{3}{4}$  in., for use on automatic machines for threading street ells and similar cast iron fittings where clearances are limited between the die head and the machine, are being put out by the



Landis solid adjustable die head.

Landis Machine Co., Waynesboro, Pa. Diameter of the die head is  $\frac{3}{4}$  in., and to provide further clearance the chaser holders are beveled off on a 45 deg angle. The head is only recommended for use on cast iron and brass fittings.

The die head consists of a head body with the chaser holders mounted on the face of the head body. Individual adjustment is provided for each chaser holder, which permits a plus or minus adjustment of approximately  $\frac{1}{32}$  of an in. on the pitch dia. Although the same head body can be used, a different

AUTOMATIC TRANSMISSIONS

TOP AND WINDOW LIFTS

LUBRICATION

# EATON ROTOR PUMPS

Provide High Efficiency at All Speeds, and  
Silent Operation for a Wide Range of Automotive,  
Farm Implement, and Miscellaneous Applications



Eaton engineers will welcome an opportunity to  
discuss the possible application of Eaton Rotor  
Pumps to products now in production or in design.

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PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR  
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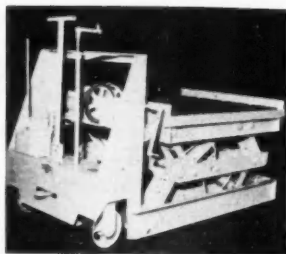
set of chaser holders is required for each dia. Overall length of the head depends upon the type of mounting used.

The head shown is driven by means of a square on the shank and it is centered by a cylindrical portion of the

shank. It is held in position by means of a draw rod through the spindle. This head uses chasers 15/16 of an in. by 1 1/4 in.—the same size as are used on the little Landis head. Head body is of air hardened steel. Chaser holders are of heat treated alloy steel.

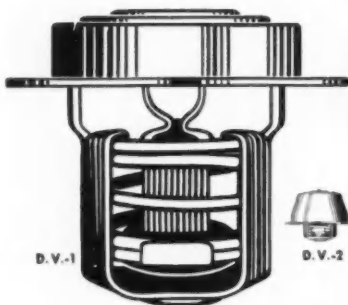
### C-111—Hydraulic Die Handling Truck

A 16,000 lb capacity hydraulic elevating die handling truck has been designed by Lyon-Raymond Corp., Greene, N. Y. Furnished with a platform 48 in. wide by 57 in. long, the



Lyon-Raymond 16,000 capacity hydraulic elevating die handling truck.

## Pace-Setters in ADVANCED THINKING —for Cooling System Control



D. V.-1



D. V.-2



D. V.-3



D. V.-4

## DOLE DV THERMOSTATS

Dole engineers looked into the future long before the new DV Thermostat was ready for the automotive industry. They came up with another "first" in thermostat design. Now Dole DV's are doing a real job in meeting the toughest needs for positive thermal control on modern cooling systems. They're entirely new in basic principles...and in step with advanced thinking in engine design. Dole DV Thermostats aid the automotive engineer in using smaller radiators, higher pump pressures. Broad coverage of engine specifications is provided by four basic types.

- Powerful spring controls high pump pressure
- Full seating pressure for quick warm-up
- Positive-acting, accurate thermal element for most efficient performance in atmospheric and sealed cooling systems



### THE DOLE VALVE COMPANY

1901-1941 Carroll Avenue, Chicago 12, Illinois  
PHILADELPHIA • DETROIT • LOS ANGELES

CONTROL with DOLE

truck provides a roller top consisting of 5 rows of rollers placed on 4 in. centers to aid in transferring heavier dies.

With roller top in place, the platform can be lowered to 24 in. or elevated to 38 in. To provide 3 in. less height in both positions, the roller top can be removed, dies being then supported by a flat steel top.

Elevation is made possible by arrangement of 4 hydraulic hoists operating against toggle levers. A two-speed hand pump operates the hoists and a finger tip release lever controls the lowering speed.

The hand winch, used to draw dies on the table, is geared to a 96 to 1 ratio and is supplied with 25 ft of steel cable. When positioned in front of a press the truck can be firmly secured by a special screw type lock that engages the floor. The large 10-in. wheels roll easily on ball bearings. An auto type steer arrangement is provided. The truck has both a towing handle for manual use or a towing bar for use with an industrial tractor.

Because each of these trucks is being built for special requirements, this type equipment is available with a wide range of top sizes and capacities.

### C-112—Resin Binder For Sand Cores

The Plastics Dept. of American Cyanamid Co., New York, N. Y., has turned out a new synthetic resin developed for the binding of sand cores, to be marketed under the trade-name Cycor 151.

It is a neat, thermosetting resin especially prepared as a water resistant foundry core binder, and claimed to contain no filler or additives. The foundry may vary the amount of Cycor 151 and/or additives to obtain cores with green and baked tensiles, permeability, hardness and collapsibility necessary for the type casting to be made.

Cycor 151 produces water resistant cores which withstand high humidity and long lay-overs in molds. It can be cured in either conventional or dielectric ovens and allows quick-cured cores for rush jobs. Because Cycor 151 is a pure resin, the user purchases only the neat synthetic resin in small quantities,

# Steering AT ITS BEST



THE WHITE MOTOR COMPANY (Model 798)

## ROSS BRINGS EASE . . . AND ECONOMY

DISTINGUISHED APPEARANCE, low maintenance cost and increased passenger comfort are outstanding characteristics of this fine product of the White Motor Company, Cleveland, operated by Capital Transit, Washington, D. C. . . . Good steering, too, supplied by ROSS.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

- (1) Increased mechanical reduction . . . (2) More compactness . . . (3) Reduction in weight . . .
- (4) Greater arm angular-travel . . . (5) Improved metallurgy . . . (6) Increased efficiency.

Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

**Ross**

**Cam & Lever STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

## NEW PRODUCTS

For additional information please use coupon on page 56

modifying it with fillers and extenders to meet his own requirements. Cylcor 151 is claimed to give foundries 33 per cent to 50 per cent faster baking time than old-time binders at baking temperatures of only 350 F. Excellent collapsibility is said to provide savings in shake-out and cleaning.

## C-113—New Acrylic Molding Power

For horn buttons, hood ornaments, instrument dials, lamp lenses, reflectors and medallions the du Pont Co., Wilmington, Del., announces commercial production of a new heat-resistant acrylic molding powder designated "Lucite" HM-140, having improved molding, color and luster properties. This newest member of its line of "Lucite" acrylic resins can be molded at temperatures about 50 deg higher than can its predecessor, "Lucite" HM-122, say company spokesmen. The new composition can be in ec-

tion molded at cylinder temperatures of 360 F to 430 F—a marked advantage in molding thin or intricate sections where fluidity must be greater. This property of the new product enables molders to obtain in finished articles the heat resistance furnished by HM-122, combined with the moldability of general-purpose acrylics.

In addition, "Lucite" HM-140 is more fluid at a given molding temperature than HM-122 was. It can be molded into thick sections at lower temperatures and therefore cools and hardens more rapidly than the old type. This results in a shorter molding cycle with less shrinkage of the molded piece.

The new product is said to be more brilliant and lustrous than other acrylics. Color stability, both at high temperatures and on outdoor exposure, is claimed increased. "Lucite" HM-140 is available in crystal, and in many transparent, translucent and opaque colors.



## GEARS

MADE TO ORDER

**SPUR.** Straight, helical, and internal. Sizes from 16 pitch, 1 1/2" dia. (approx.), to 1 1/2" pitch, 36" dia. (approx.).

**HERRINGBONE.** Sizes from 1 1/2" to 15"

**STRAIGHT BEVEL.** Sizes from 16 pitch, 1 1/2" dia. (approx.), to 1 1/2" pitch, 28" dia. (approx.).

**SPIRAL BEVEL.** Sizes from 16 pitch, 1 1/2" dia. (approx.), to 1 1/2" pitch, 28" dia. (approx.).

**HYPOID.** Sizes from 1 1/2" to 28" dia. (approx.).

**ZEROL.** Sizes from 16 pitch, 1 1/2" dia. (approx.), to 1 1/2" pitch, 21" dia.

**WORMS AND WORM GEARS.** Worms to 7" dia. Worm gears to 36" dia.

**SPLINED SHAFTS.** Lengths to 45" Diameters from 1" to 6"

**DIFFERENTIALS.** Complete units.

FAIRFIELD MANUFACTURING CO.

319 S. Earl Ave., Lafayette, Indiana

for FINE GEARS

## C-114—Fast-Machining Screw Steel

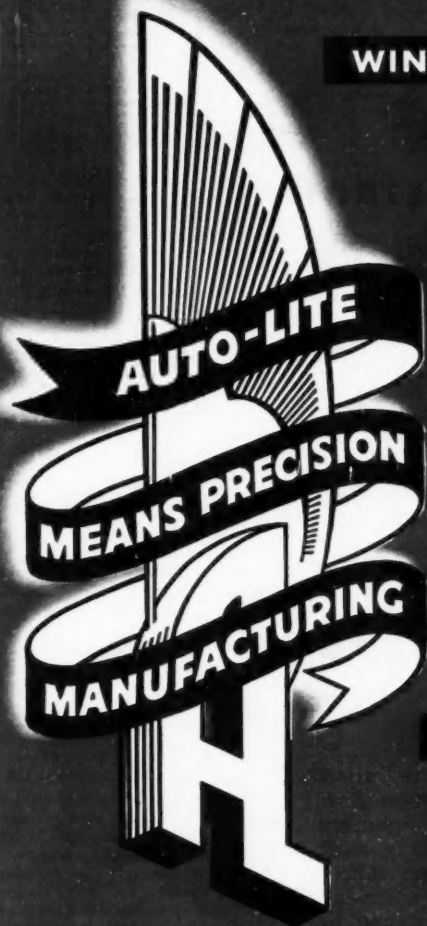
Jones & Laughlin Steel Corp., Pittsburgh, Pa., announces a new steel which can be machined 10 to 25 per cent faster than the fastest standard free-machining Bessemer screw steel in commercial use today. This J&L "E" steel can now be furnished in cold-finished bars. It is claimed to open the way for increased production and lower costs in the manufacture of nuts, screws, studs, fittings and other machined products.

The former king of the Bessemer screw steels was B-1113, which has a machinability index of 135. Field tests in the development of "E" steel show an index as high as 170—nearly 25 per cent higher than B-1113. In addition, "E" steel is declared to have a smoother finish after machining, better cold working and cold forming properties, and to give longer tool life on screw machines than its predecessor.

During experimental stages in which a total of 6,178 tons were used by 45 different industrial manufacturers' tests, a large producer of nuts stated that production had been increased 15 per cent over B-1113 by using "E" steel. Finish excellent. Another nut manufacturer said production had been increased on certain machines from an average of 1,607 pieces per hr to 1,832 pieces per hr. Tool life doubled.

In the manufacture of business machines, an increase of 100 per cent in tool life and uniformity of finish in machining of small parts was reported. Almost identical data was turned in by a producer of machined sleeves. Tool life in the production of certain pipe fittings was reported by one manufacturer to have increased from an average of 8 hrs to an average of 16 hrs, operating at normal speeds.

A loom manufacturer said production was increased 10 per cent in two separate runs. (Turn to page 78, please)



**SPARK PLUGS**

**BUMPERS**

**WINDSHIELD WIPERS-ELECTRIC**

**REGULATORS & RELAYS**

**GENERATORS**

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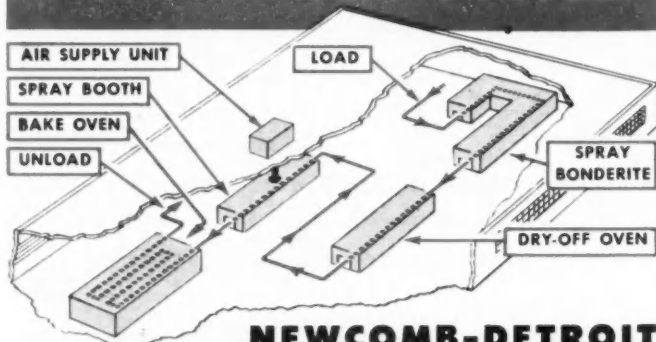
**SWITCHES**

**DISTRIBUTORS**

**MOTORS**

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## Here's a PRE-ASSEMBLED FINISHING SYSTEM



### NEWCOMB-DETROIT

*Engineered - Built - Installed It*  
for **PORTABLE DISH WASHERS**

Every piece of equipment in this finishing system was pre-assembled and factory-tested for performance prior to shipment from the Newcomb-Detroit plant. Even the air supply system is pre-assembled and stationed on the plant roof to save space.

The system is used to rustproof (in the six-station spray bonderite section), spray paint (white synthetic enamel) and bake portable dish washers in the eastern plant of one of the world's largest appliance manufacturers. The entire system was designed, built and installed by Newcomb-Detroit and the pre-assembly technique used saved many man-hours in field assembly and try-out as well as the usual long disruption of plant production.



This is the pre-assembled Unit Wash Air Supply unit installed on the roof. It is a compact, complete system in one unit. Available in a wide variety of capacities.

This is typical of Newcomb-Detroit engineering and construction. And they have applied this ingenuity to finishing systems for all types of industries during the last thirty-five years. Why not drop a line for your Newcomb representative to drop in and discuss your finishing problem? No obligation . . . just write Newcomb-Detroit, 5747 Russell St., Detroit 11, Michigan.

EST.  
1912



## NEWCOMB-DETROIT

*Engineered Systems—Standard Units*

Spray Booths • Ovens • Metal Parts Washers • Fans  
Dust Collectors • Heaters • Air Handling Equipment

Grand Rapids Div.—Plant  
GRAND RAPIDS 2, MICH.

Main Office and Plant  
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Western Sales  
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## NEW

*Production  
and Plant*

## EQUIPMENT

For additional information please  
use coupon on page 56

(Continued from page 48)

parison of the enlarged projected image with a correspondingly enlarged outline drawing of the particular tool, thread, gauge, etc., 6, 10, 20, 30 or 50x full size, without requiring special gratitudes which have always imposed serious limits on the applications of such microscopic measuring.

Possibilities of application of this new Swiss instrument for screw threads include checking core diameters, pitch, angle of inclination, and form of thread, and measuring angles of gages and templates and the edges and angles of cutting tools.

In checking profiles of diverse workpieces such as tools, gages, etc., comparisons are made with enlarged drawings to scale. Drawings for this purpose can without difficulty be executed to within 0.004 to 0.006 in. Assuming a magnification of 30x, the error in the accuracy of the drawing in reference to the object is said to be of the order of 0.00012-0.0002 in.

In operation the drawing of the profile outline is inserted in the top part of the instrument and the illumination switched on. The outlines of the profile drawing or tracing, which can be either in ink or pencil, appear red when viewed through the eyepiece, the image of the object itself appearing green.

The two different colors are therefore in sharp contrast, the contour lines of the drawing and the image always showing up clearly, even in case overlapping occurs. The microscope eyepiece presents to the eye an erect image without distortion, and any writing on the piece under examination appears clearly and legibly. Illumination and contrast in color can be adjusted within a wide range by turning the step switch.

Two special tool carriers are provided for objects that cannot be placed directly on the table.

Measuring table is 5½ in. by 8 in. with rotating glass center; range of measurement of angles with goniometer is 360 deg reading on vernier 5 ft; largest dia possible of measurement is 3 17/32 in; microscope comes complete with standard accessories.

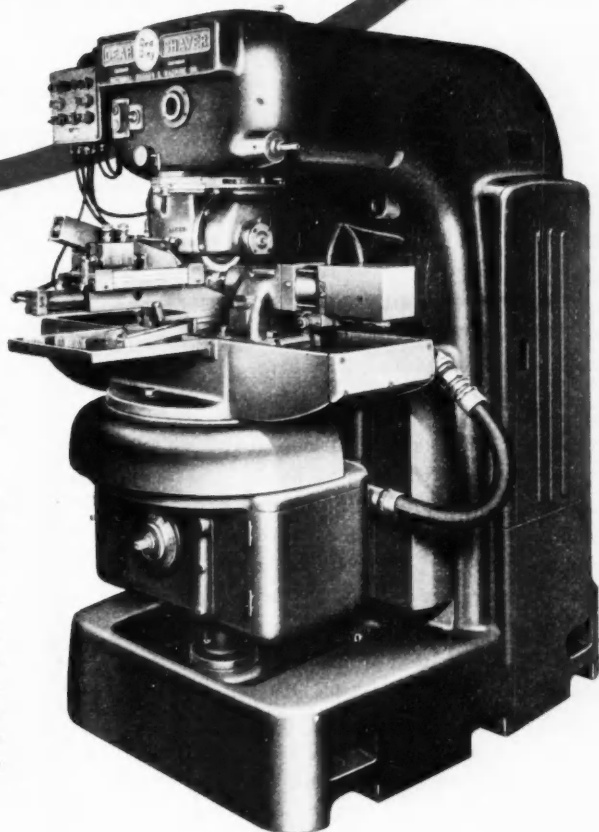
# **AUTOMATIC LOADING** permits you to turn out Precision Gears with unskilled operators at **MAXIMUM PRODUCTION RATES**

You as a gear manufacturer under present industrial and market conditions can correctly evaluate production equipment that:

- ① Assures extremely close gear tolerances consistently.
- ② Does not require any mechanical skill to operate.
- ③ Eliminates operator fatigue and its effect on morale.
- ④ Operates continuously at mass production speed.

That is precisely what you can have with Red Ring Automatic Loading in connection with Gear Shaving Machines GCU or GCV.

Either of these machines so equipped can be run continuously merely by keeping a supply of work gears in the magazine and removing the finished gears. One operator easily serves a battery of machines, for the entire machining operation is entirely automatic.



SPUR AND HELICAL  
GEAR SPECIALISTS  
ORIGINATORS OF ROTARY SHAVING  
AND ELLIPTICAL TOOTH FORM

*Production rates are phenomenal.  
Write for descriptive literature.*

**NATIONAL BROACH AND MACHINE CO.**

3600 ST. JEAN \* \* \* \* \* DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

*Announcing*

*the* **NEW**

**DANLY**

## HEAVIER CONSTRUCTION FOR

Danly Heavy-Duty *Autofeed* Presses are performance-engineered for faster, automatic stamping of parts. Now, the most complete line in the field, these presses offer the cost-saving advantages of coil-fed operations through a wider range of capacities.

Heavy-Duty *Autofeed* Presses are of extra heavy construction. The frame, slide, clutch, and drive units are of much heavier design for the rated capacity of the press. Consequently, deflection and

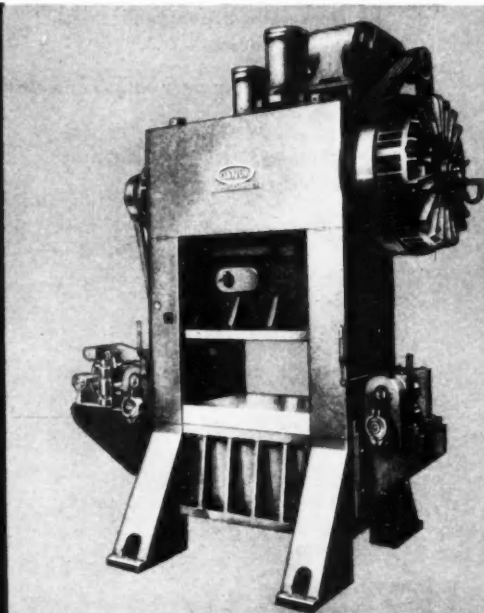
vibration is substantially reduced at higher operating speeds. Stamping accuracy is improved, and die life is increased, permitting longer production runs between grinds.

Highly versatile, Danly *Autofeed* Presses meet the all-around needs of the average production stamping shop. They are especially designed for ease of die changing and die setting, and low maintenance costs—today's best answer for more profitable stamping operations.

### FLOATING FRICTION DISC CLUTCH REDUCES MAINTENANCE

Other cost-saving features of Danly *Autofeed* Presses include an exclusive air-cooled, air-operated clutch. Used on all Danly presses, this clutch has withstood millions of engagements under test without perceptible wear. Low clutching inertia reduces heat and wear, yet flywheel energy is actually greater. There is less maintenance and fewer production interruptions.

Built-in automatic lubrication, two-point over-size slide connections, and Danly proof-tested electrical controls are likewise performance-engineered features that help promote more efficient, safer press operations.



DANLY SERIES HA 50 TO 150-TON  
NON-GEARED ECCENTRIC SHAFT DRIVE  
SPEEDS: 7.5-300 S.P.M. STROKES: 1-4 INCHES



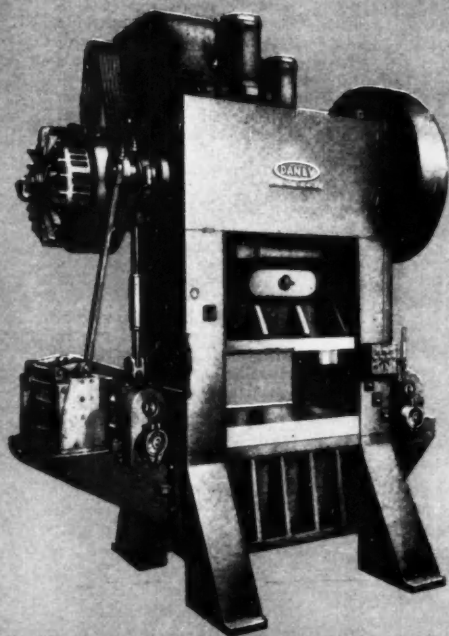
# COMPLETE LINE OF

## *Autofeed* PRESSES

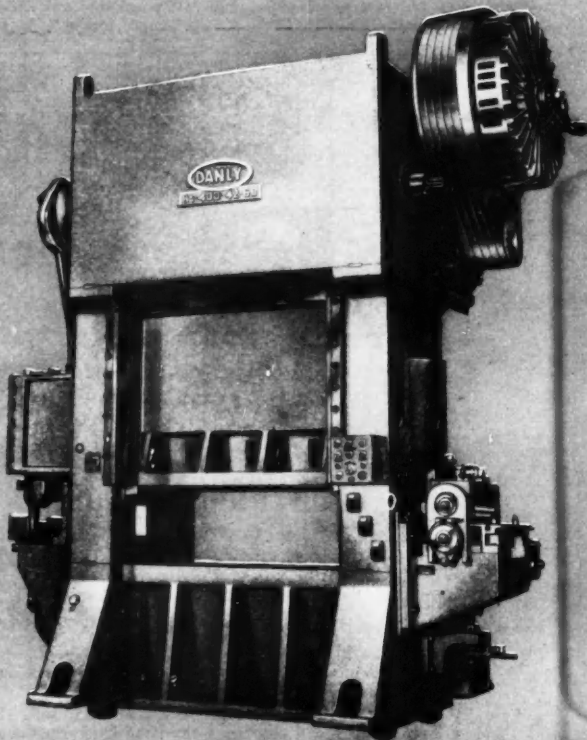
**RATED CAPACITY .. SIZES FROM 50 TO 800 TONS**

### WRITE FOR NEW CATALOG

Learn more about these modern presses. Write for the new Danly *Autofeed* Press Catalog. It includes complete specifications, description of operating features, and details of stock handling equipment.



DANLY SERIES HA 50 TO 150-TON  
GEARED ECCENTRIC SHAFT DRIVE  
SPEEDS: 40-150 S.P.M. STROKES: 3-7 INCHES

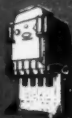


DANLY SERIES HA 200 TO 800-TON  
ECCENTRIC GEAR DRIVE  
SPEEDS: 20-80 S.P.M. STROKES: 4-8 INCHES

**DANLY MACHINE SPECIALTIES, INC.**  
2100 SOUTH 52ND AVENUE • CHICAGO 58, ILLINOIS

### STANDARD *Autofeed* LINE OF PRESSES

In addition to the Danly Heavy-Duty *Autofeed* Presses, there is a complete Standard *Autofeed* Line of presses available from 50 to 150-ton capacities. The standard line is built with the same high precision and also has the same exclusive Danly mechanical features as the extra-massive Heavy-Duty *Autofeed* presses.



OVER 25 YEARS OF DEPENDABLE  
SERVICE TO THE STAMPING INDUSTRY

## NEW PRODUCTS

For additional information please use coupon on page 56

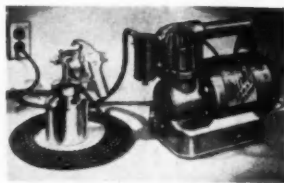
(Continued from page 72)

rate tests on different screw machines, and the product showed marked improvement in finish. Used in production of transmission parts, improved finish and satisfactory peening qualities were reported.

### C-115—Portable Paint Spray Unit

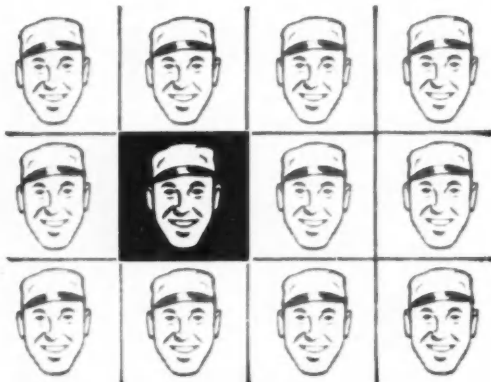
A portable paint spray unit introduced by the Binks Mfg. Co., of Chicago, Ill., is designed for use where low air pressure and large volume are important. This 47-lb paint spray unit of only 1/3 hp is claimed capable of spraying any coating with the same efficiency as a unit of one horsepower.

The DP (meaning direct-drive piston) portable paint spray delivers 40 lbs working pressure and ample volume to operate Binks standard spray guns. It plugs into any 110-120 volt AC line. Compressor is 15 1/2 in. long, 11 1/2 in.



Binks DP portable paint spray unit.

high, and 7 1/2 in. wide at the base, with no exposed moving parts. Motor has a safety cut-out overload switch. Over-size cooling fins on the compressor make for cool operation.



ALL GOOD WORKERS . . .

*but one does MORE than  
the job assigned!*

Like an ambitious, able workman, Parco Cleaners do more than they are required to do.

Parco Cleaners do more than remove grease and soil. The line of specialized metal cleaners formulated by Parker condition the metal for the next step in finishing.

When you use a Parco Cleaner, factors in addition to the type of soil determine the type of cleaner to be used. The experienced metal finishing expert from Parker Rust Proof Company will help you select the cleaner that will contribute most to the economical, efficient production of the finish on your product.

Whether your production calls for cleaning before a Parker Process, general cleaning, or cleaning before plating, use a Parco Cleaner!

ALKALI CLEANERS • EMULSION CLEANERS  
ACID CLEANERS • WATER CONDITIONERS

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

*Parker*

PARKER RUST PROOF COMPANY  
2178 East Milwaukee Ave.  
Detroit 11, Michigan

BONDERIZING Holds Paint to Metal . . . PARKERIZING Inhibits Rust . . . PARCO  
LUBRIZING Retards Wear on Friction Surfaces

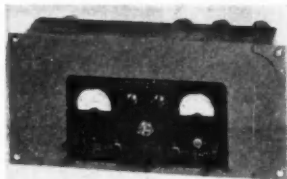
### C-116—Diamond Abrasive

A diamond abrasive introduced by the Industrial Products Division of the Elgin National Watch Co., Aurora, Ill., is prepared with a newly developed synthetic vehicle said to permit standard time analysis procedures in connection with lapping and polishing operations. Advantages of the compound are claimed to accrue from the nature of this synthetic vehicle carrying the diamond abrasive, and from the accuracy in grading of the actual diamond particles to assure rapid, uniform cutting action.

The synthetic vehicle is reported to be universally soluble in commercial solvents and water, and to leave no dulling film on finished surfaces. Its increased range of temperature stability, from 150 F to -50 F, permits machine lapping with diamond abrasives.

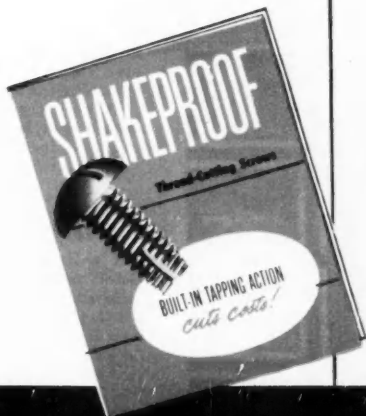
Typical uses are for finishing carbide and hardened steel parts, plastic molds, drawing dies, bearing surfaces; for precise lapping of hardened gages; and for polishing the cutting edges of all types of cutting tools.

### C-117—Voltage Regulator



Adding to its line of voltage regulators, Sorensen & Co., Inc., Stamford, Conn., present a B-Nobatron, a highly stabilized source of high voltage low amperage DC, for use by industries, laboratories and scientists. The line is in contrast to Sorensen Nobatrons which are employed as highly stabilized sources of low voltage high amperage DC. The B-Nobatron, furnished in gray wrinkle, may be housed in a metal cabinet or mounted on a standard relay rack. Regulation accuracy is within 1 per cent.

# ELIMINATE TAPPING IN *any* MATERIAL



SEND FOR THIS FREE BOOK!

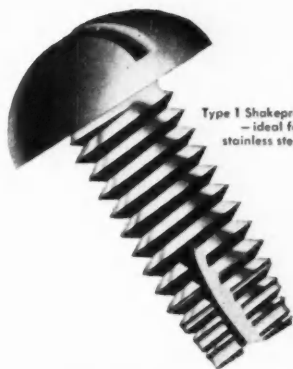
Shakeproof Thread-Cutting Screws actually cut their own snug mating threads in practically any material... costly separate tapping operations are completely eliminated! The exclusive Shakeproof thread-cutting slot in each screw forms a sharp, serrated cutting edge... assuring true tapping action as the screw is driven. Special heat treatment makes Shakeproof Thread-Cutting Screws stronger too... nearly twice as strong as ordinary machine screws! And, because each screw fits tightly in its self-cut, perfectly mated thread, maximum resistance to vibration loosening is assured!

All these advantages will make your assembly process simpler and more efficient... see how in the new Shakeproof Thread-Cutting Screw book. You can check the typical applications shown against your own... and there's convenient technical data too! Write for your free copy today!

SHAKEPROOF Inc., Division of Illinois Tool Works, 2501 North Keeler Avenue, Chicago 39, Illinois. In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario.

## Shakeproof

THREAD-CUTTING SCREWS



Type 1 Shakeproof Thread-Cutting Screw  
— ideal for a wide range of steels,  
stainless steels and the harder alloys.



Type 23 Shakeproof Thread-Cutting Screw  
— assures efficient thread-cutting action  
in the softer metals and die castings.

See how Shakeproof  
Thread-Cutting Screws will reduce your production costs!



Type 25 Shakeproof Thread-Cutting Screw  
— provides maximum resistance to strip-  
ping and decreases internal stresses  
in plastic applications.



FASTENING HEADQUARTERS  
TRADE MARK

## General News

(Continued from page 23)

firms, the OBE says. Where some of the larger concerns expect some increase in business—such as the automotive segment of the manufacturing field—most companies with assets of \$1 million or less expect a decline of sales up to eight per cent. Manufacturing as a whole expects no more than a one per cent decrease, mining as much as three per cent, and trade, one per cent.

### Federal Reserve Relaxes Instalment Buying

Further relaxation of Federal controls over instalment buying has been ordered by the Board of Governors of the Federal Reserve System. The new easing of credit restrictions contained in the Board's Regulation W became effective on April 27. The changes include: maximum maturity in 24 months instead of 21 months; reduction in down payments of from 15 per cent to 10 per cent; and exemption of furniture, appliances, and other articles costing less than \$100. The Board made no change in Regula-

tion W insofar as it applies to down payments on automobiles. One-third of the purchase price of an automobile is still required as down payment. The new modification in Regulation W is the second such change ordered by the Board since controls over instalment buying were revived in September, 1948. The Board on March 7 reduced the down payment requirement from 20 per cent to 15 per cent and extended maturity from 15 and 18 months to 21 months.

### Wilson Retires As Head of Chrysler Sales

Earl B. Wilson has retired as director of sales of the Chrysler Div. of the Chrysler Corp. In the automobile business since 1914, Mr. Wilson is approaching the age of 65, and is retiring under the Chrysler retirement plan. He started with Buick where he served 10 years and then joined Chrysler in 1924.

### Bizonal Germany Made 9900 Vehicles in January '49

A postwar monthly record of 9941 motor vehicles were produced in Bizonal Germany in January, 1949, compared with 9216 in December, 1948, according to the Commerce Dept. The January output included 4774 passenger cars; 4043 trucks; 181 busses; 251 road tractors and 692 farm tractors.

### Univ. of So. Calif. Developing New Supersonic Ram Jet

The University of Southern California is developing a new type of supersonic ram jet engine for guided missiles under a \$2.5 million Navy grant.

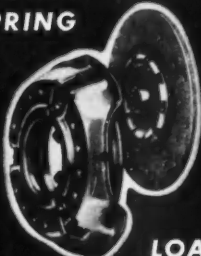

### Completing Prototype of New British Fairley

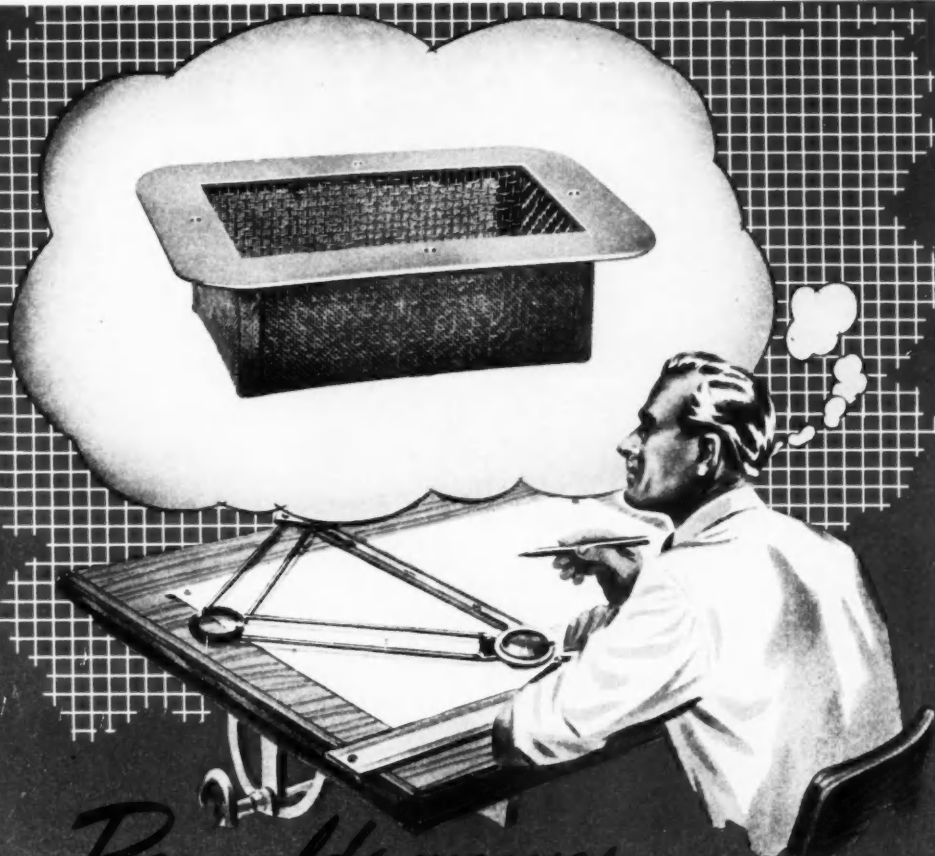
The prototype of a new light car, the Fairley, is being completed by James Fairley and Sons, Sheffield, England. The car has a speed of 75 mph, it is said, and a gasoline economy of 40 mpg.

### West Europe Transportation System Recovering Apace

Western Europe's transportation system has recovered to such an extent that dollar requirements for transportation equipment in the fiscal year 1949-50 will be less than the \$140 million authorized for the Marshall Plan nations in the first year of the European Recovery Program. The Economic Cooperation Administration points out, however, that Marshall Plan countries

(Turn to page 88, please)

Learning Your Clutch Needs	Improve YOUR Product with	Automotive and Aircraft
Analyzing the Problem		Trucks and Busses
Designing the Clutch		Tractors and Road Machines
Planning Production		Farm Machines and Implements
Tooling Up		Oil Field Rigs and Pumps
Manufacturing	<b>ROCKFORD</b>	Industrial
Checking and Testing	<b>CLUTCHES</b>	Mowers and Light Machines
Supervising Installation	<p>If you are looking for a better way to transmit and control power within your product — an easy solution is to let our engineering department give you the benefit of their long, specialized experience in this field. Just send us a print of your design, with necessary specifications. We will submit a confidential analysis and a recommendation for a <b>ROCKFORD CLUTCH</b> application that will improve the operation of your product.</p>	Engines and Marine Units
Servicing		Machine Tools Production Units
		<p><b>ROCKFORD CLUTCH DIVISION</b>          800-WARNER          315 Catherine Street, Rockford, Illinois</p>



*Reynolds weaves*

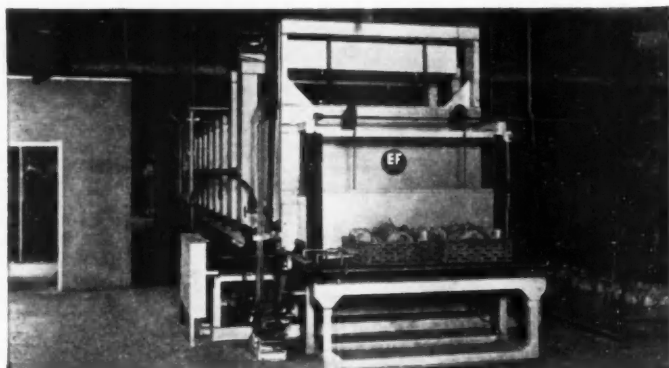
## WIRE CLOTH EXACTLY TO YOUR SPECIFICATIONS

• Yes, your product is different. The wire cloth you put into your product must meet its special needs. You want cloth that is different from "standard." Then write your own specifications—Reynolds will weave it accordingly. Specify the metal or alloy, as well as the diameter of the wire—temper, workability and flexibility will be right! Weave and mesh of the cloth, and finish, too—all exactly as ordered. Reynolds knows how—from 53 years' experience. If you want your industrial wire cloth "tailor made," send your specifications to Reynolds engineers, metallurgists and weaving experts... an inquiry neither costs nor obligates you.

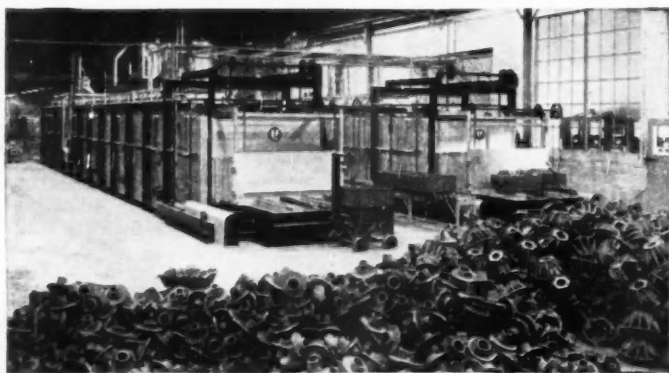


**REYNOLDS WIRE CO., DIXON, ILLINOIS**

# EF MALLEABLE FURNACES



## SHORTEN THE CYCLE



## FROM DAYS TO HOURS

● EF special atmosphere short cycle malleablizing furnaces produce a better, more uniform and scale-free anneal—in shorter time—at lower cost. They reduce the amount of material tied up in process—speed deliveries. Packing in pots is entirely eliminated, reducing the fuel requirement—the labor cost—and improving working conditions in the plant. Continuous types like those pictured above, or batch type furnaces, fitted with gantry cranes or other material handling equipment if needed to facilitate the handling of large, heavy castings. Radiant tube gas-fired, oil-fired or electrically heated, to use the fuel available or best suited to your specific requirement.

We build furnaces for every foundry annealing and heat treating requirement. Let the EF engineers work with you on your next job.



**THE ELECTRIC FURNACE CO.**

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES  
FOR ANY PROCESS, PRODUCT OR PRODUCTION

*Salem - Ohio*

## Engine Production

(Continued from page 35)

in the classification of what is generally termed "Small Gasoline Power Units." In this group of engines 1,551,540 were built which were under 21 hp. This type of engine is rapidly taking on added importance and today is being applied to a multitude of uses such as generator sets, compressors, pumps, home appliances, auxiliary farm implement equipment, lawn mowers, hand tractors, chain saws, etc. Complete descriptions of these engines and all the other engines covered in this report of

**Table VI—Outboard Motors—In Units and Their Value By HP Rating and Displacement**

(Dollar Values In Thousands)

	Total Shipments and Inter-plant Transfers	
	Units	Value at Plant
2.9 hp and less .....	83,951	\$ 5,296
3.0 to 3.9 hp .....	110,368	6,733
4.0 to 5.9 hp .....	247,696	21,431
6.0 to 7.9 hp .....	99,514	9,382
8.0 to 8.9 hp .....		
9.0 hp and over .....	42,929	7,196
5.9 cu. in. and less .....	219,012	15,182
6.0 cu. in. and over .....	365,446	34,856
<b>Total—All Outboards</b>	<b>584,458</b>	<b>\$50,038</b>

Internal Combustion Engines compiled by the Industry Division, Bureau of the Census will be found in the 1949 Statistical Issue of **AUTOMOTIVE INDUSTRIES**, published March 15, 1949.

Diesel and semi-Diesel engines have taken on added importance both during and since World War II. In 1939 only 19,263 Diesels, other than automobile and other than those used for installation in ships, boats and tractors built by the same establishment were produced, while corresponding production for 1947 amounted to 68,617, an increase of about 256 per cent. Diesels installed in the products of the engine builders during 1947 amounted to 40,283 but no comparable figures for 1939 are at present available.

The outboard motor has become increasingly popular. In 1937 their production amounted to 77,705. It increased to 129,335 during 1939 but by 1947 had skyrocketed to 584,458, an increase of 350 per cent over 1939.

**AUTOMOTIVE INDUSTRIES, May 15, 1949**

# CLARK AXLES

FOR TRUCKS  
AND BUSES



*The Standard of Comparison*

CLARK EQUIPMENT COMPANY, SUDBURY, MASSACHUSETTS

OTHER PLANTS: BAYON, CALIF.; JACKSON, TENN.; AND INDIANAPOLIS, IND.

SEE OTHER SIDE

# MATERIAL HANDLING *News*

## TAKING THE BOTTLE NECK OUT OF BOTTLE HANDLING



Boxes or bales, barrels or bottles, it doesn't matter what kind of package constitutes your handling problem—consider whether this illuminating experience of Cleveland Coca Cola Bottling Co. does not suggest an easy, money saving way to whip it.

During an eight-hour day more than 12,000 cases, each containing 24 fresh bottles, come off the conveyor lines from the bottling machines—and Clark fork-lift trucks take over. And every day brings new, emphatic proof that the Clark Method has indeed taken a serious bottle neck out of bottle handling, and cut handling costs to a minimum.

In this fast-stepping business with its tremendous volume, swift turnover and narrow profit, speed is necessary—and speed is the essence of the Clark Method.

As the cases of freshly filled bottles come off the conveyor line they are placed on pallets, 30 cases to each unit load; and are taken by fork-lift trucks either to storage, or to be loaded directly for delivery. For

distribution the company uses vehicles designed specifically for the purpose—trucks of 240-case capacity for trade deliveries, and semi-trailers that carry 1200-case loads to nine strategically located warehouses, each serving a territory by means of regular delivery trucks.

Handling "empties" is the same simple routine in reverse—palletized cases of empty bottles returned to the main plant by trucks and trailers, and handled at both ends by the fork trucks.

How Clark machines have increased productive capacity is shown by the fact that Clark fork lift trucks can unload and reload a delivery truck in seven minutes—and that a big semi-trailer can be unloaded and reloaded in less than an hour.

In addition to the basic job of handling palletized cases, all heavy lifting work is performed easily by the Clark machines. And on top of tremendous time savings a 30 per cent reduction in breakage is a plus-benefit reported by the company.

Isn't it worth a small time investment to win big savings? The Clark Method is winning them every day—in businesses like yours. Talk over your problems with a Clark representative—you'll find it's good business to CONSULT CLARK.



1400-lb units of 30 cases each are tiered in temporary storage. The Clark Method cut breakage 30 per cent



From the bottling line cases are assembled on pallets. The Clark Method eliminated several handling operations

## CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS



INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 67, MICH.  
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD  
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

PRODUCTS OF CLARK — TRANSMISSIONS

FORK TRUCKS & TRACTORS

AXLE HOUSINGS

GEARS AND FORGINGS

RAILWAY CAR TRUCKS

ELECTRIC STEEL CASTINGS

FRONT AND REAR AXLES FOR TRUCKS AND BUSES

METAL SPOKE WHEELS

TRACTOR UNITS

# Motorized Expansion in Canada

(Continued from page 25)

slopes of the Laurentians had sufficient pulpwood stands to confine operations to the cutting lands drained by such rivers as the Mistassini, Saguenay, St. Maurice, Ouareau, Papineau, Gatineau and Ottawa and their tributaries, all flowing toward the St. Lawrence Basin. However, once the Divide was passed in the search for new forests, the water-flow was found to be northward to James Bay, the southern arm of Hudson Bay. The only potential markets to be sought in that direction, even if adequate harbor and shipping facilities for seasonal trans-Atlantic movement of no more than four months' limit existed, would be those of Great Britain, Eire, and the European Continent, geographically a disadvantage for Canadian exporters against the well-organized and established all-year competition of the Scandinavian pulpwood industry. The alternative was obviously quicker transport and heavier unit loads to the southern milling and buying centers to compensate for the increasing distance trend. The answer was motorized freighting and mechanized loading and unloading operations.

The heavy capital expenditure entailed in the highway building and automotive transport program is already beginning to pay off in the insurance of virtual year-round movement of pulpwood from the cutting-grounds to river and lake dumping sites and the elimination or reduction of many slow-downs and suspensions occasioned by climatic conditions. A determining factor in the changeover was the inability of horse-drawn vehicles to move any appreciable loads on the upgrades. Hitherto the trend of incline had been downward from uplands to sea level on the southern watershed, but when the hauls started up the northern Laurentians' slopes, it became necessary to reduce the horse-drawn loads to an uneconomical minimum. The tractor semi-trailer, the Snowmobile (described in *AUTOMOTIVE INDUSTRIES*, April 1, page 31), the bus for crew and technical personnel, the tractor-train, the Drott loader and the pusher unloader, and gasoline and Diesel engines all then made their entrance.

The highways thus far constructed have averaged 20 mi in length and vary in width from 15 to 40 ft, mostly gravel-ballasted and surfaced, with some sand roads in the vicinity of Sanmaur. They have been privately financed with no sharing of costs by Provincial, county or regional governments, and are owned and maintained by the pulp producers. The outlay has been at rates ranging from \$200 to \$30,000 a mile. Except in a few instances, the gradient has not been a major engineering problem, running generally from zero to a maximum of ten per cent. The Divide reaches a

crest of slightly less than 2000 ft above sea level, so the paramount consideration has been basic strength and adequate support for peak loads of 25 cords weighing 2½ tons each.

Within the area immediately north of the Divide, which comprises approximately 100,000 sq mi (roughly equivalent to the combined areas of Delaware, Pennsylvania, New Jersey and New York), 1000 automotive vehicles are

estimated to be in active use for timberhauling for the pulp producing interests and, during the winter, the period of heaviest operation, an additional 1000 obtained from contractors. Canadian and American equipment, of course, assume the burden of transport, but several British makes have been included in the proving ground tests, and among the smaller units a French Latil tractor weighing 8000 lb, with

## SNOW FULL UNIVERSAL MACHINES

### PRODUCTION OF SMALL PARTS OFTEN TRIPLED

Tomorrow's profits must come from lower costs. "Push Button" machine tools are imperative in today's competition. Snow Drilling, Tapping and Threading Machines are establishing amazing records daily. For faster production at lower cost Snow Machines are unsurpassed—versatile—economical.



AIR-OPERATED,  
ELECTRICALLY  
CONTROLLED  
DRILLING, TAPPING  
AND THREADING  
MACHINES



SNOW DRILLING MACHINE —  
Extremely sensitive pressure  
control allows drill to establish  
proper feed—cuts drilling time  
lengthens tool life.



SNOW THREADING MACHINE  
— Produces accurate threads  
true to lead and thread form.  
Standard master fixtures  
minimize handling time.

SNOW TAPPING MACHINE — Typical of advanced design and performance is the Snow Full Universal Tapping Machine. Electrical controls allow selection of operation method. Extreme sensitivity to power application prevents tap breakage. Class 3 and 4 file and production up to 5000 parts per hour are possible. 4 size cover range from #0 to ¼" in mild steel.

**Snow**  
HIGH PRODUCTION DRILLING,  
TAPPING, THREADING, NUT  
MACHINES, 2 SPINDLE HORIZONTAL  
MACHINES, DRILL PRESSES, TAP  
HEADS, JOBS AND FIXTURES

SNOW MANUFACTURING COMPANY 437 EASTERN AVE., BELLWOOD, ILL. (SUBURB OF CHICAGO)

four-wheel drive for four-wheel steering, has been used. Even the Snowmobile has been adapted to pulp service requirements by a bus tonneau accommodating 14 passengers while hauling one or two cords of four-ft lengths on a trailer. It is equipped with a winch, and the trailer has a "sloop" with goose-neck for loading. The Snowmobile's special advantage is that it is not dependent upon roads, and can operate across almost any terrain not too thickly forested. An army jeep has also been among the vehicles in the tests.

The underlying motive of the auto-

motive experiments, which have extended over a 15-year period, were thus summed up by B. J. McColl, M. E., of the Woodlands Section, CPPA, whose paper, "Trends of Truck Hauling Costs," was heard at one of the Montreal sessions and who participated with W. A. E. Pepler in another discussion, "Present Status of Mechanization of Woods Operations in Canada," as follows:

"Every year the industry is having to go farther and farther from stump to landing, and distances have reached a point where horse-drawn equipment is no longer practicable. Mechanical prime

movers of every type are being tried on an experimental and production basis to determine the optimum methods for pulpwood transport."

Canadian representatives of Canadian and American automotive and accessory manufacturers participated in the convention sessions at Montreal.

It is understood that some trailer equipment is being custom-built to the specifications of the pulp producer engineers.

## Magnesium and Aluminum Reduce Trailer Weight

(Continued from page 29)

as the trailer. They are composed of a series of lengthwise, magnesium I-beams, the upper flanges of which are joined to form the complete "board." The lower flanges of the I-beams rest on the cross sills. One outer I-beam is provided with a tongue; the one on the other side of the "board" has a groove, the tongues and grooves being made to interlock.

When used in a "reefer," another element (termed a "keeper") is used between each pair of "boards" to lock them to the cross sills and to promote free movement of air beneath the payload. The "keeper" is a low, single-section element that is tongued and grooved. It is mated with the tongue and groove of the adjoining "boards" and secured by countersunk screws to the anchoring pieces in the insulated portion of the floor to hold the top-flooring elements in place.

The tongues and grooves are coated with a sealing compound before assembly to assure a watertight floor. Air is circulated and water is drained along V-shaped recesses over each I-beam section and the troughs created by the "keepers," eliminating the need for duct boards in most cases. Specially-formed sidewall floor sections fit the outer "boards" and carry the magnesium floor several inches up the sidewalls, serving as built-in flashings.

The weight saving stemming from the use of the new Fruehauf magnesium floor is 23½ lb per running ft of trailer. On a 30-ft unit, this saving amounts to over 700 lb. On a 35-ft refrigerator van with gravity tandem, the weight eliminated by these features when compared with the same model with conventional equipment amounts to about 800 lb for the magnesium floor; 135 lb for the aluminum vertical supports; 187 lb for the forged aluminum wheels; 80 lb for the pressed steel brake shoes; and 45 lb for the aluminum gear boxes—a total saving of around 1250 lb.

In addition to reducing weight, the major advantage of the magnesium floor is the elimination of checking, warping and the expansion and contraction, moisture and odor absorption to which wood is subject.



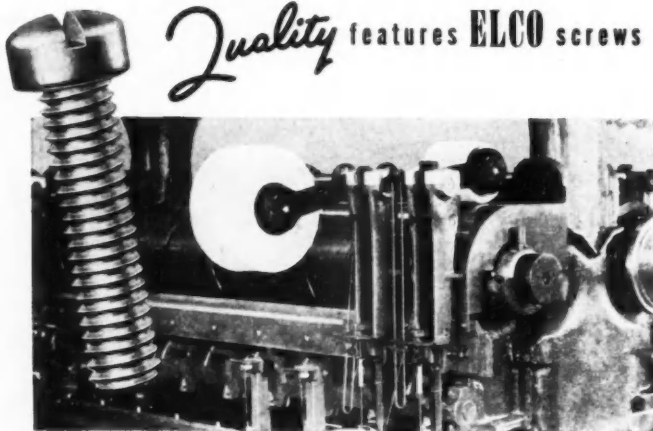
EMBLEM OF QUALITY

### AUTOMATIC SPOOLING MACHINES

Picture the kind of accuracy needed to keep thousands of parts synchronized... to maintain winding speeds up to 900 yards per minute... to operate a modern textile spooling machine. This kind of job requires screw fastenings with constant holding power, with snugly fitting threads to resist vibration, with truly centered heads to hold parts in accurate alignment.

Elco screws are made accurately and precisely under production control so that they will meet these user needs. Snug fitting threads, perfect heads and slots, easy starting threads... these features make for dependable assembly and consistent service in operation.

If you have a problem of matching fastener accuracy with the precision of other component parts, use Elco screws on your next order for a new experience in dependable trouble-free fastening.



*Quality* features **ELCO** screws



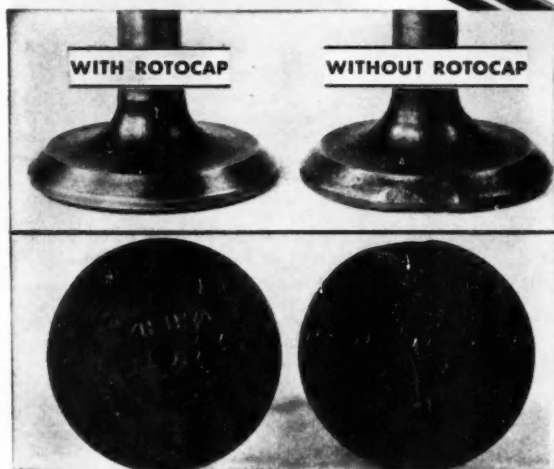
**ELCO TOOL AND SCREW CORPORATION**

1914 BROADWAY ROCKFORD, ILLINOIS

WOOD SCREWS • MACHINE SCREWS • MACHINE SCREW NUTS • DRIVE SCREWS • CAP SCREWS  
LAG SCREWS • SPECIAL SCREWS • TAPPING SCREWS • STOVE BOLTS • PIPE PLUGS

# THE NEW Thompson ROTOCAP

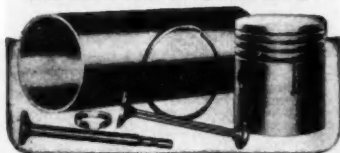
gives two to five times  
LONGER VALVE  
LIFE!



## A TRUCK MANUFACTURER'S TEST

Unretouched photographs of two exhaust valves after 538-hour dynamometer test by a leading truck builder. The test was made under full load at 3200 r.p.m. in a 6-cylinder heavy-duty engine. The top and side views of the valve at the right, used without the ROTOCAP, show severe burning, warping and pitting. Note the clean, undamaged condition of the valve at the left, which was fitted with the ROTOCAP. As a result of this and other road and laboratory tests the manufacturer adopted the ROTOCAP.

Thompson improvements in precision parts engineering include Steel-Balanced Pistons, U-Flex Oil Control Rings, Cylinder Sleeves, Valve Seat Inserts, Sodium-Cooled Valves, Valve Rotocaps.



The ROTOCAP is supplied completely assembled and attaches to the valve tip with conventional split-type valve retainers.

## THE IMPROVED POSTWAR ROTOCAP

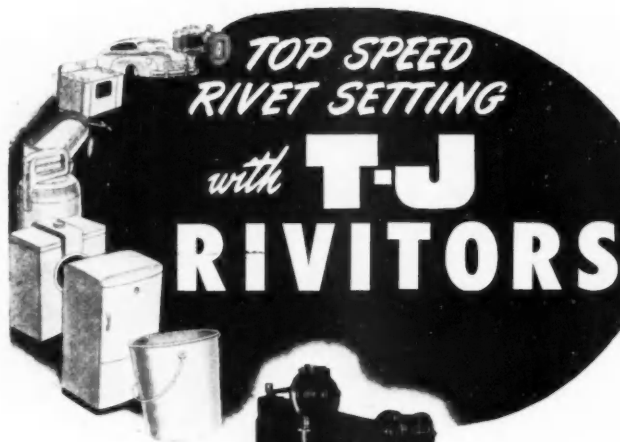
assures positive valve rotation at all engine speeds and at the rate of rotation best suited to each make of engine. Replacing the conventional valve spring retainer, it eliminates blow-by, sticking, warping, burning and pitting.

The constant wiping action of the turning valve keeps the valve face and block seat clean and smooth. Wear and heat are evenly distributed, assuring a lasting seal and efficient cooling. The rotating action also keeps the valve stem free in the guide.

Our own tests and those of engine builders who have adopted the ROTOCAP prove that it lengthens average valve life two to five times. For further information, write—

# Thompson Products

CLEVELAND • DETROIT • LOS ANGELES • ST. CATHARINES, ONTARIO



★ **AUTOMATICALLY  
FEEDS AND SETS  
SOLID RIVETS!**

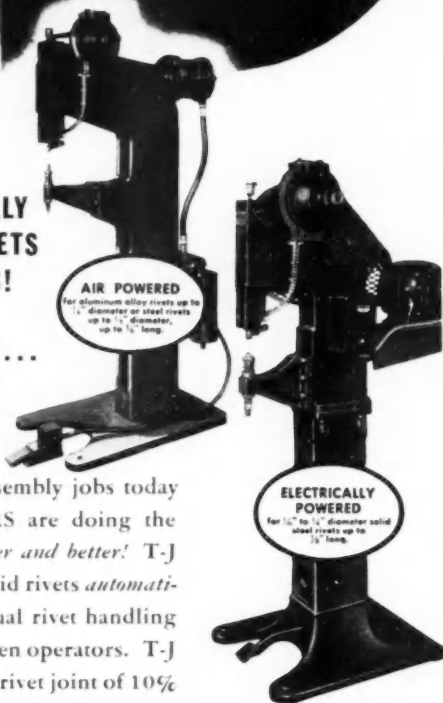
★ **SAVES LABOR...  
CUTS COSTS!**

On countless assembly jobs today—T-J RIVITORS are doing the rivet setting *faster and better!* T-J feeds and sets solid rivets *automatically*... no manual rivet handling... easy for women operators. T-J produces a solid rivet joint of 10% to 15% greater strength—a completely filled hole... no flashing... a neat, balanced head. Handles many types of rivets, including counter sunk head, flat head, round head, full and semi brazier head. Sturdily built... trouble-free operation... T-J dependability. Write for bulletin. The Tomkins-Johnson Company, Jackson, Michigan.

**32 YEARS EXPERIENCE**



**TOMKINS-JOHNSON  
RIVITORS**



**AIR POWERED**  
for aluminum alloy rivets up to  
1" diameter or steel rivets  
up to 1" diameter,  
up to 12" long.

**ELECTRICALLY  
POWERED**  
for 1/2" to 1" diameter solid  
steel rivets up to  
12" long.

## General News

(Continued from page 80)

will actually be receiving more transportation equipment than they did last year because the bulk of what was contracted for in 1948 still remains to be shipped. Plans call for the expansion of Western Europe's truck fleet by one million vehicles between now and 1952. It is expected that in the coming fiscal year alone, more than \$40 million will be earmarked for this program. As a whole, ECA regards the postwar recovery of Western Europe's transportation system as exceptionally rapid.

### National Battery Gets USAF Order Totalling \$240,000

A \$242,450 order for 5000 aircraft batteries has been placed with the National Battery Co. by the Air Force Material Command, Wright Field, Ohio.

### Cook Heads Chrysler Dept. of Business Management

Howard J. Cook, formerly assistant regional manager of the Detroit region for Chrysler Corp., has been appointed director of the Chrysler Conference of Business Management. Associated with Chrysler for the past 22 years, he succeeds Harry G. Moock who retired April 30.

### Firestone Introduces Fourth Line Tire

Competition is getting more rugged all the time in the tire industry. The Firestone Tire & Rubber Co. has announced the introduction of a fourth line passenger car tire. Other major tire producers are expected to follow Firestone. A year ago Firestone and Goodyear brought out second and third line tires. This year both Firestone and Goodyear have also introduced second line truck tires in sizes ranging from 8.25 x 20 down.

### Award French SAE Medal to Jules Salomon

Jules Salomon, Citroen's first chief engineer, has been awarded the honors medal of the French Society of Automobile Engineers. Starting as a draftsman in 1891, Mr. Salomon joined the Unic Co. in 1903, and produced a four-cyl model with a one-piece cylinder casting and a two-bearing crankshaft turning at 2400 rpm. A professor for several years at a French state engineering school, Mr. Salomon formed the Zebre Co. in 1914, and produced a

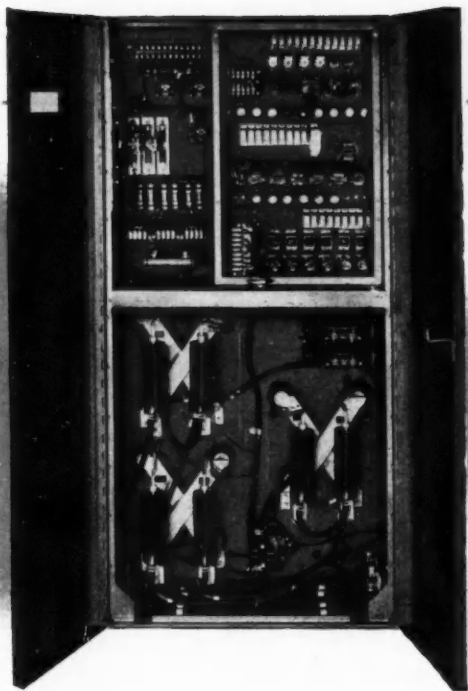
(Turn to page 90, please)

YOU CAN BE **SURE**.. IF IT'S  
**Westinghouse**

For your Resistance  
Welding Applications



*NOW...*



## **a 3-PHASE CONTROL** **cuts kva demand in half**

Here's a new, cost-cutting answer to resistance welding problems caused by power use restrictions, excessive power costs or poor weld quality. It's the Westinghouse 3-phase, low-frequency welding control that cuts kva demand in half, while providing good welds on all types of metals.

Rusty or scaly steels, aluminum, brass and steel alloys join easily and the job goes smoothly because there's less tip pickup... less spitting at the electrodes. This is because the control, which is designed to spread kva over the three phases, distributes the load and provides for a smooth flow of heat into the metal. Kva demand is less because of the reduction of secondary reactance that accompanies operation at lower frequencies.

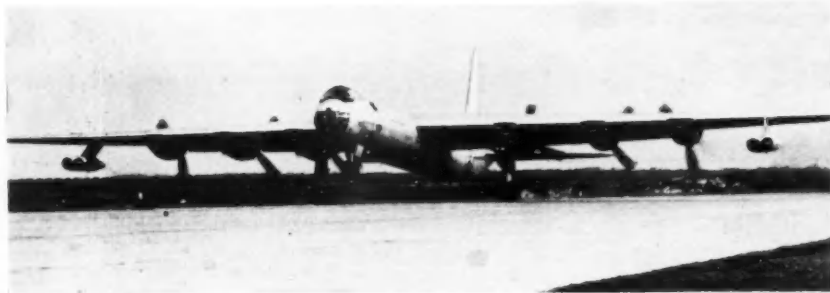
This is a complete packaged unit that controls all mechanical and electrical functions for the welding machine. It can be mounted on the floor or on the side

of the machine. A swing-out panel provides easy access to all components and circuits. It can be applied to existing installations by changing the welding machine transformer.

For complete details, see your Westinghouse representative, or your local resistance welding machinery agent. Ask for B-4341. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, Pa. J-60718

**Westinghouse**  
**ELECTRONIC**  
**CONTROL**



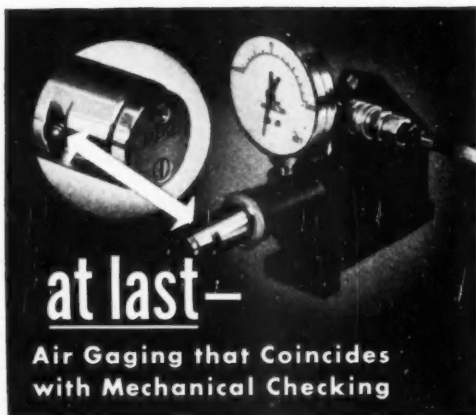


## JETS FOR THE GIANT

Shown making its first test flight at Fort Worth, Tex., this USAF Consolidated Vultee B-36 is equipped with four J-35 jet engines in addition to its regular six 3500-hp reciprocating engines. Two jet engines are slung beneath each wing for added power at take-off, and for increased speed over the target.

Armed

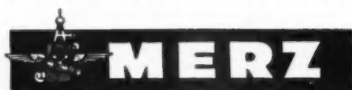
the button does it



**at last—**  
Air Gaging that Coincides  
with Mechanical Checking

Merz Neu-Matic Measuring Machines—and only Merz—give you air gaging that coincides *exactly* with mechanical checking. **THE EXCLUSIVE SAPPHIRE BUTTON DOES IT!** In Merz Neu-Matic Measuring Machines air pressure is metered *only* by the *Sapphire* spindle button. Only the *Sapphire* button contacts the surface measured. Thus, only the *actual* dimension is measured—readings are totally unaffected by surface variations, perforations, key ways, etc. Now—for the first time ever—you can have all the speed and ease of air gaging with precision accuracy that equals or excels mechanical checking. Now you can place air gages and mechanical gages side-by-side on your production lines—and get identical readings, every time! Let your Merz gaging specialist give you a demonstration—in *your own plant, on your own work*. Write today!

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, INDIANA



car embodying many features which have since been universally adopted.

When André Citroën decided, during World War I, to get into big automobile production, with the then unheard-of program of 100 cars a day, he selected Jules Salomon as his chief engineer. Later, Mr. Salomon was attached to the Rosengart and the Peugeot Cos.

## Costa Rican Air Chief Conferring with CAA

Mario Waldemar Facio Segreda, Director of Civil Aviation and Captain of the National Air Force of Costa Rica, is visiting the United States for a series of conferences with officials of the Civil Aeronautics Administration, and for study and observation of the latest developments in various phases of civil aviation.

## Used Car Market Lags Behind New Car Sales

While new car sales have spurted sharply and are continuing to gain, the used car market in Detroit, at least, is in the doldrums. Dealers are unable to explain why the market for used cars is so weak, and why it has not followed the normal spring upturn that has prevailed in new car sales.

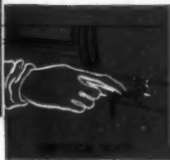
## Boor Opens Gear Engineering Office in Indiana

F. H. Boor has announced the opening of a gear engineering office in Lafayette, Ind. Mr. Boor was chief engineer of the Fairfield Mfg. Co. of Lafayette for more than 20 years, and was in charge of gear and tool design, purchasing of special tools, experimental and research work.

## World Motor Transport Talks In Switzerland, Aug. 23

A world conference on road and motor transport problems will get underway on Aug. 23 at Geneva, Switzerland.  
(Turn to page 92, please)

SPECIALISTS IN ALL TYPES OF STARTING



PUSH-  
BUTTON STARTING



# COSTS LESS

WITH THE *Bendix*

# STARTER DRIVE

● The use of push-button starting on most of America's finest cars definitely establishes it as a quality feature—preferred by the majority of motorists. Bendix has proved to many manufacturers that push-button starting costs less with a Bendix\* Starter Drive. Simple, compact design lets it be mounted almost anywhere; fewer parts make it easier to service; 79,000,000 installations prove its dependability! That's why two of the three leaders in the lower priced car field have chosen the Bendix Starter Drive. Your inquiry will bring further information on cost.

\*REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of  
ELMIRA, NEW YORK

Detroit Office: 8-212 General Motors Bldg.



# 1949 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS\*

	Passenger Cars	Trucks	Buses	Totals	
				1949	1948
January	326,019	104,599	656	431,278	405,663
February	324,547	101,700	418	426,665	383,002
March	402,402	115,171	545	518,118	492,034
Total	1,052,968	321,470	1,621	1,376,059	1,280,699

## 1949 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS\*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	312,199	13,820	91,282	13,317	610	40
February	310,343	14,204	88,540	13,180	326	92
March	365,834	16,568	99,925	15,248	423	122
Total	1,008,376	44,592	279,747	41,723	1,367	254

\*—Automobile Manufacturers Association.



## BUR-TEX LUGGAGE COMPARTMENT LINING NO. 179

- BUR-TEX eliminates luggage compartment drumming noises
- BUR-TEX is simple to install in single time-saving operation
- BUR-TEX plastic coated, plastic printed surface is easy to wash
- BUR-TEX is available in any color or pattern to suit your needs

BURLINGTON MILLS INCORPORATED • BURLINGTON WISCONSIN

Below are typical attractively embossed patterns now in production.



# General News

(Continued from page 90)

land. This convention was proposed at the second session of the Transportation and Communications Commission of the United Nations Economic and Social Council held at Geneva in April, 1948. Its primary purpose will be to conclude a new world-wide convention on road and motor transport to replace the 1926 convention which has long been obsolete. The meeting will also review the 1931 convention on road signals.

## Renault Design Head Retires

After heading the Renault designing department for 50 years, Charles Serre has retired. Mr. Serre joined Louis Renault in 1899 when he started production in a wooden shed on his father's country property at Billancourt, just outside Paris, France. The two remained associated until Louis Renault died at the close of the war.

## FCC Authorizes 2-Way Radio for 200,000 Vehicles

Two-way radio has been authorized for some 200,000 vehicles, according to Wayne Coy, chairman, Federal Communications Commission. He also predicts that within five years, 500,000 vehicles will be so equipped. Included are 32,000 radio-equipped taxicabs, 26,000 utility company trucks, and 50,000 mobile police units.

## Union Demands Pensions from Packard This Year

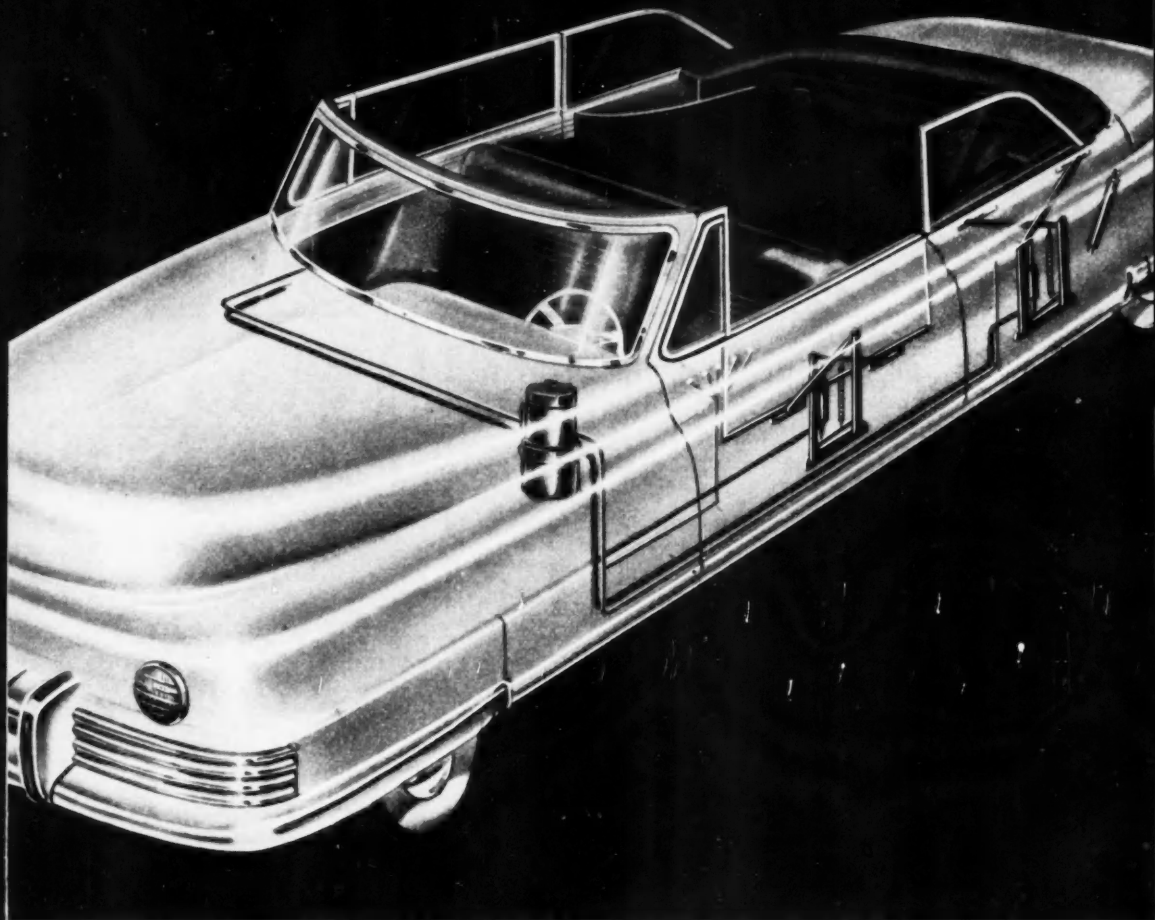
The UAW-CIO has served a demand on Packard for monthly pensions of \$100 upon retirement at the age of 60, health and life insurance benefits, and cost of living wage adjustments. The two-year Packard contract is subject to opening this year on economic issues only. The demand on Packard was not considered particularly significant since it is known that the pension and wage issue will be fought out with Ford first.

## International Harvester May Offer Workers Stock

The stockholders of the International Harvester Co. are to vote this month on a plan which would enable employees to purchase stock in the company. It calls for making available to employees 1.2 million shares of common stock, not previously issued, at a price based on the highest and lowest prices recorded on the New York Stock Exchange during the year.

(Turn to page 96, please)

AUTOMOTIVE INDUSTRIES, May 15, 1949



## Let Hydraulic Power Do It All

The Detroit Harvester Hydro-Lectric system provides a versatile source of hydraulic power for a wide range of push-button control applications. From a single power unit, the Hydro-Lectric system raises and lowers front and rear door windows, quarter windows, adjusts driver's seat, and operates folding tops on convertible vehicles. It can also be supplied for raising or lowering rear deck lids, hoods, and back window lights.

As the pioneer in this field, Detroit Harvester is equipped through experience, personnel, and facilities to engi-

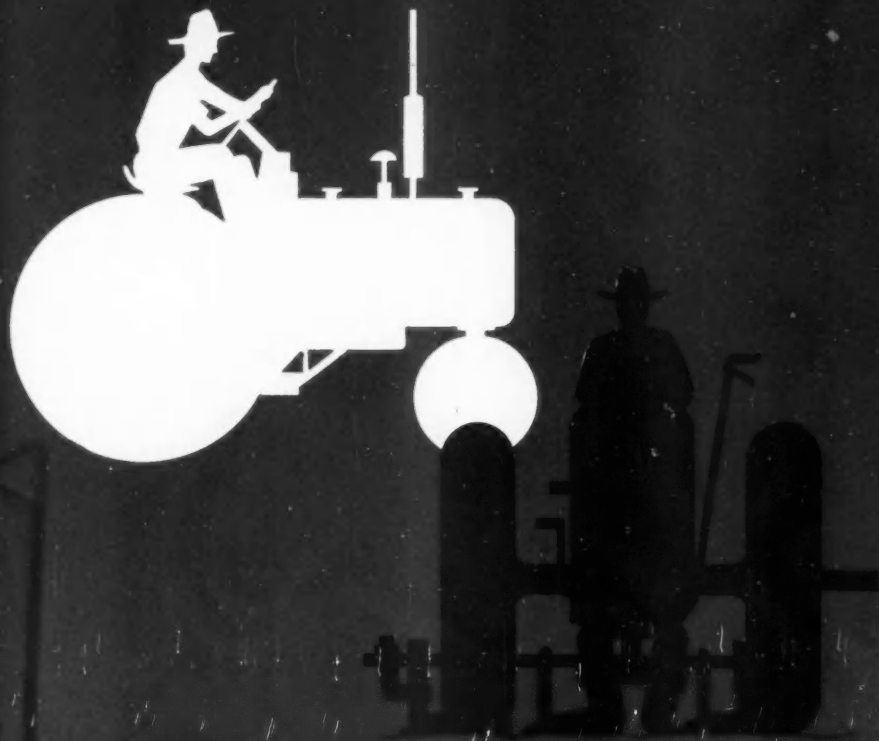
neer and produce hydraulic servo mechanisms which combine every desirable advantage at minimum cost. We are now supplying car manufacturers with thousands of units daily.

. . .

*Hydro-Lectric Top, Window, and Seat Control Systems*  
*Convertible Tops • Automobile Body Hardware*  
*Manual Window Regulators • Window Glass Channels*  
*Power Take-Offs • Contract Production Parts*  
*Farm Mowers • Power Sweepers*

**DETROIT HARVESTER COMPANY**

DETROIT • YPSILANTI • TOLEDO • ZANESVILLE



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**ON FARMS**

● Farm tractors, working long hours while coated with abrasive dust and dirt, are particularly tough on brake linings and clutch facings.

Tractor manufacturers, therefore, are mighty careful in selecting friction material for original equipment. And every one of the eight major manufacturers in this field uses R/M materials!

R/M brake linings and clutch facings are available in a wide range of types and sizes, with varying frictional characteristics. In practically every field where brakes and clutches are used, manufacturers rely on R/M help . . . in both design and supply of friction materials.

Whatever your problems, you'll find the R/M representative well-informed and helpful. When you call him in, you call on the integrated experience of four great plants, four research organizations, and four testing laboratories . . . all ready to serve you.

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## Forgings from **KROPP**



"Happy Landings" on landing gears of forged steel parts! Forged steel, and only forged steel, has the toughness to take the full shock of fast landings—on bumpy fields—in subzero weather . . . and yet be light enough for use on high speed planes.

Forged steel is steel at its best . . . and Kropp forgings are forgings at their best. That's why they are selected for vital parts of so many of America's finest planes . . . trains . . . motor cars . . . machine tools . . . agricultural, construction and oil field machinery. Our complete drop, hammer and upset facilities are at your service. We will be glad to quote on your forging needs.

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Are you receiving "FORGINGS" . . . the KROPP publication for industry? If you want to keep current on forging facts, send us your name and address and ask for "FORGINGS".

## General News

(Continued from page 92)

ing a three months period. About 70,000 employees with two or more years of service would be eligible under the plan. Although there would be no restrictions on disposal of the stock, a limitation would be placed on the number of shares which any one employee could buy.

### British Car Shows Net Over \$600,000

The profit on the two English automobile shows, passenger cars and trucks, the first to be held since the war, totaled \$612,000. This amount goes to the credit of the Society of Motor Manufacturers and Traders, the organizers of the event. The passenger car exhibition netted \$467,774, and \$144,226 came from the truck show. The passenger car show will be renewed this year, from Sept. 28 to Oct. 8, but there will be no truck show before 1950.

For the first time the London show will be staged ahead of the one in Paris, which will open on Oct. 6. Other sources of income for the British manufacturers' association were subscriptions totaling \$417,816. A balance of accumulated income carried forward for the year 1948 amounted to \$439,196. The biggest single expenditure was \$240,000 subsidy to the Motor Industry Research Association. This association is about to open a test track, the first of its kind in England, on Lindley Airfield, near Nuneaton, Warwickshire.

### Mine Bureau Estimates Cost of Making Synthetic Fuel

Bureau of Mines engineers estimate the average current cost of producing synthetic fuels at between 10 and 15 cents a gallon, depending on allowances for by-products and the rate of plant amortization. Admittedly, still higher than the cost of producing fuels from petroleum, bureau officials predicted that with the cost of discovering petroleum still rising, someday the two cost lines would cross, perhaps within the next 5 to 10 years.

### Correction to Cummins Diesel Engine Article

In the article, "Cummins Introduces New High-Power V-12 Diesels," which was published in the April 15 issue of *AUTOMOTIVE INDUSTRIES*, information was furnished us that the two V-12 Diesel models have aluminum cylinder heads and that Model HRBS-600, a six cylinder Diesel, has four valves per cylinder. Instead, Cummins states, the new V-12 Diesels are equipped with alloy cast iron cylinder heads and Model HRBS-600 has two valves per cylinder.

# Be Right 3 Ways...

## PICK FORD POWER!

- 1 **RIGHT POWER** for your job in the five models of Ford's Industrial Engine line
- 2 **RIGHT FEATURES**—the best of the latest, right from Ford Industrial Power "Headquarters"
- 3 **RIGHT SERVICE**, right around the corner from you . . . at Ford Dealers' everywhere!



Ford 239 V-8 Industrial Engine  
(239 cu. in. displacement)



On streets, parking lots, playgrounds—any paved surface—the Wayne Motor Sweeper gives a clean sweep at less cost per mile, handles easily in restricted quarters. Made by the Wayne Motor Sweeper Division of Brown-Bevis Co., Los Angeles, this equipment uses, for motive and sweeping power, the Ford 239 V-8 Industrial Engine—a prime factor in the economical operation, reliable performance and simplified maintenance of the unit.

Now—5 great engines in the Ford Industrial Power "family." A "four" of 120 cu. in. displacement . . . two "sixes"—226 cu. in. and 254 cu. in. displacement . . . two "V-eights"—239 cu. in. and 337 cu. in. Every one completely new, with the *right* power for your job—farm implement power; construction; standby units; material handling; pumping, etc. Send a post card today for specifications.

### FORD MOTOR COMPANY

INDUSTRIAL AND MARINE ENGINE SALES DEPARTMENT

Dearborn, Michigan

**YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED**

# Hot Dimpling Magnesium Sheet

(Continued from page 43)

finer dimple. The electrode holder is raised  $\frac{3}{8}$  in. above the bottom ledge by means of a steel coil spring (7) in Fig. 5.

Approximately 85 lb are required to depress the holder spring (see Fig. 5) to the point where it forces the actuating arm (9) to trip the micro-switch (5). The pressure can be varied by turning the knob (6), causing the cam

(8) to move the plate (4) on which the micro switch (5) is mounted. By increasing or decreasing the distance between the rocker arm (9) and the micro switch (5), the amount of spring pressure can be varied. This makes it possible to adjust the spring accurately to prevent arcing before sufficient contact pressure has been reached. The micro-switch sets off the electronic timer

which closes the circuit from the power supply to the transformer. The electronic timer may be set to permit current to travel through the circuit for a period of 0.05 to 1.0 sec. The compression squeeze machine employed is a Chicago Pneumatic 450 E. A.

To illustrate the operation, assume that the timer is set at 0.1 sec and the transformer at 1-1. The machine operating switch is closed. Air pressure is developed which brings the ram and the top electrode down, forcing the die into close contact with the drilled sheet resting on the male punch. The die and punch in joint contact with the metal sheet travel down until the lower electrode reaches the bottom ledge. During this travel, the rocker arm (9), Fig. 5, trips the micro switch which causes the timer to initiate the current flow to the transformer. The current flows 0.1 sec before the circuit is opened. The metal is heated before the lower electrode reaches the bottom. When the lower electrode reaches bottom, the ductile hot metal has been shaped between the punch and die.

The current first passes through the edge of the hole, then radially through the surrounding area (see Fig. 4). Thus, the temperature is greatest where the severest forming occurs. This local and rapid heating makes it possible to use higher forming temperatures and also prevents warpage caused from the heating. The use of intercooling cools the metal so rapidly there is no working hazard caused by the high temperatures used in the forming operation. Also, little warpage or distortion is caused by the heat.

It is of the utmost importance that the forming action be timed to permit good contact before the current flows and to permit the current to flow before the forming of the dimple occurs. If the current flows before good contact is made, arcing of the metal and tool results. If the current travels after the dimple is partly or fully formed, it will arrive after the damage (caused from cold forming) is done.

Preparation of the material for dimpling of magnesium alloys by the resistance method requires very careful attention. Any protective coating on the surface of the material must be removed from the area contacted by the sets and must be free from dirt, oil and all other foreign substance. This prevents arcing and burning of the material in contact with the set. The tendency towards arcing and burning is the most serious aspect of the resistance method when used on magnesium alloys.

It is essential that the holes drilled for dimpling be drilled several thousandths (Turn to page 100, please)



**EQUIPPED TO BUILD  
the best  
RADIATORS**

This duplex machine mills both ends of radiator side members at once, assures exactly same length for all. This means joints under no strain between tubes and header plates.

From foundry to shipping room, Yates-American has the most complete facilities in the industry for building radiators. Our own foundry, pattern shop, well-equipped tool room and the most modern machine tools available give complete and exacting control over every phase of manufacturing.

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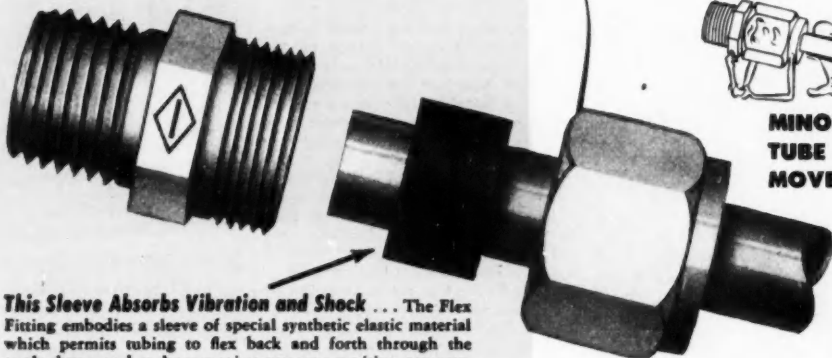
Yates-American is able to meet exacting requirements and maintain on-time delivery schedules. For every type of heat transfer application — motor and industrial trucks, tractors, compressors, locomotives, power plants — Yates-American is equipped to give you the best.

**YATES-AMERICAN MACHINE CO.**  
HEAT TRANSFER PRODUCTS DIVISION      BELOIT, WISCONSIN

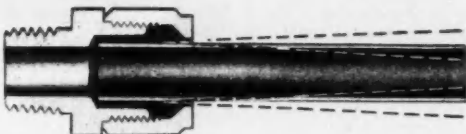


# IMPERIAL FLEX FITTINGS

*for connecting tubing where there is*



**This Sleeve Absorbs Vibration and Shock . . .** The Flex Fitting embodies a sleeve of special synthetic elastic material which permits tubing to flex back and forth through the angle shown and at the same time assures a positive, pressure-tight seal.



**Flex Fitting Makes Joints Virtually Indestructible by Vibration . . .** On tests where ordinary fittings failed after 73,000 cycles of vibration, Imperial Flex Fittings have withstood over 20,000,000 cycles without failure as indicated in the chart below:

COMPARATIVE VIBRATION TEST					
NUMBER OF VIBRATIONS IN CYCLES					20,000,000
100,000	200,000	300,000	400,000	500,000	
Flare Fitting failed after 72,450 cycles					
Compression Fitting failed after 79,350 cycles					
Mi-Duty Fitting failed after 401,925 cycles					
FLEX FITTING showed no signs of failure after . . .					21,424,500 cycles

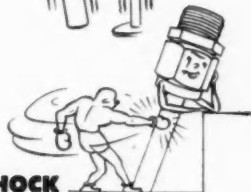
THE IMPERIAL BRASS MFG. CO., 1241 W. Harrison St., Chicago 7, Ill.

# IMPERIAL

PIONEERS IN TUBE FITTINGS  
AND TUBE WORKING TOOLS



**MAJOR  
VIBRATION**



**SHOCK**



**MINOR  
TUBE  
MOVEMENT**

**For All Kinds of Tubing . . .** Imperial Flex Fittings can be used with all types of seamed and seamless metal tubing, including copper, aluminum, thin-wall steel, monel, stainless steel, etc.

**Easy to Install . . .** All that is necessary is to slip nut and Flex sleeve over tubing. Then insert tubing into fitting body as far as it will go, and assemble. On sizes larger than 1/2" O.D. and where higher pressures are involved, end of tubing should be belled slightly.

**Proved by Extensive Use in the Field . . .** Used as standard equipment on trucks, tractors, diesel engines, oil filter connections, heavy power equipment, machinery, etc.

## CATALOG No. 344-B

gives complete engineering data on Flex Fittings including types, sizes, dimensions, specifications and applications. Write for your copy.



**skilled springmakers...  
AND practical,  
experienced engineers,  
SPECIALISTS  
in spring design  
and manufacture**



IT takes people to make springs. Ours are specialized, highly trained, long-experienced people—well qualified to give you the finest in spring craftsmanship.

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*Springs, Wire Forms, Stampings*

sands undersize so they can be reamed to size after dimpling. Deburring the holes prior to dimpling is not necessary and in most cases is detrimental if not done smoothly. The cutting edge of the deburring tool leaves a sharp notch which promulgates a crack when dimpled.

#### Conduction Method

This method consists of heating the dimpling sets by means of suitable heating elements mounted in close proximity to the sets. In operation the dies are partially closed so that the material is gripped firmly, and a dwell period of sufficient duration occurs to heat the material by conduction to the proper forming temperature just prior to the application of full pressure which forms the dimple.

The dimpling sets are heated by cartridge heater with an output of 150 watts set in heating elements which surrounds the sets, as illustrated in Fig. 6. A suitable temperature control mechanism maintains the proper temperature range while the dimpling machine is in operation.

The squeeze, Chicago Pneumatic 450 EA Pedestal Squeeze, must be adapted so that the material to be dimpled may be firmly gripped by the dimpling sets. This allows a sufficient length of time for the proper forming temperature to be reached by the material prior to application of full pressure which results in dimple formation.

The temperature of the sets should be maintained between 300 F and 400 F, and the dwell time should vary from one to five sec depending on the sheet thickness and the dimple size. The larger the dimple size and the greater the sheet thickness, the proportionately longer dwell time or higher heat required to form the dimple satisfactorily.

No special requirements are necessary in preparation of the surface of the material for dimpling, and sheets of the alloy may be dimpled satisfactorily through most types of protective coatings.

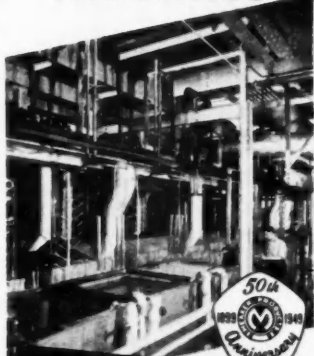
#### Production Dimpling

Qualifying a machine for production use has been accomplished through the use of two control specimens (see Fig. 7 and Table I). The use of the type A specimen is to control the amount of heat used. By pulling this specimen in a calibrated tensile machine, it is possible to control the actual tensile strength of the material. Thus, if too much heat is used, the pressure in psi will drop, showing an annealed dimpled area. This specimen is unusually effective in detecting any malfunctions of the machine toward overheating. Fig. 7 also gives the widths of specimens for the different rivet sizes.

Type B specimen is used to control various other items such as canning, dimple flushness, die marks, and

(Turn to page 102, please)

## MEAKER Electroplating Machines



**AUTOMATIC MACHINES**  
STRAIGHT-A-WAY and RETURN TYPE  
for mass production of  
large or small pieces

**SEMI-AUTOMATIC MACHINES**  
For supplementary capacity  
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**SPECIAL MACHINES**  
For any special plating  
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Equipment tailored to fit your requirements, making every operation in the plating sequence automatic, or as mechanized as possible, is the profitable way to handle electroplating on a production basis. This Meaker method applies equally well to departments with only moderate daily output and to the largest and heaviest plating needs of the mass production plants. It offers not only a lower unit cost, but the production is increased, and a better and more uniform quality is assured.

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## FOUR MILLION DRIVERS say so!

*One reason  
is, it's  
automatic*

Trico's Automatic Windshield Washer is the leader in car buyers' acceptance in 1949.

That's because car and truck owners really want it.

More than four million users tell others how indispensable it is when road mist, dust and grime blur the view ahead.

Right now Trico's stepped-up advertising is appearing monthly in 17 million copies of the Saturday Evening Post, Life, Time, Collier's and the Country Gentleman to promote universal use of this important safe-driving aid.

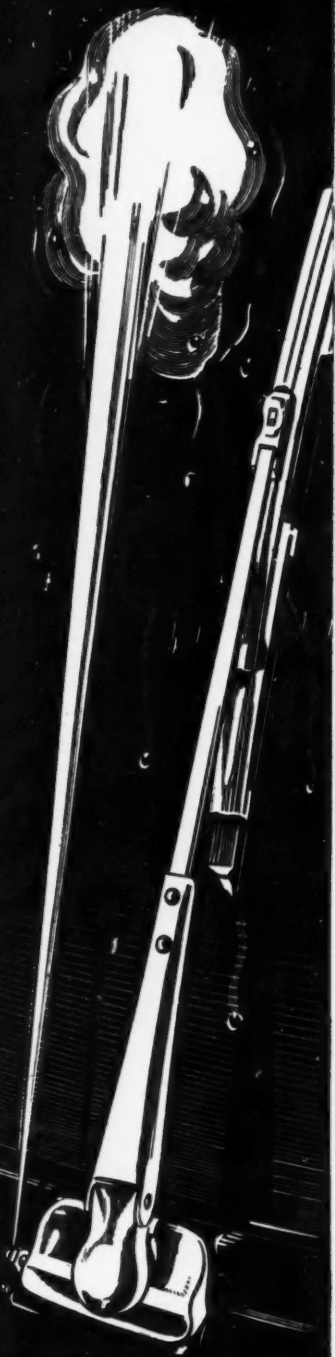


The famous "Two Little Squirts"



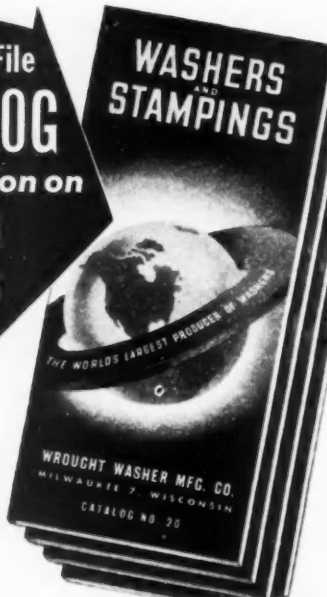
### *Windshield Washers*

FULLY AUTOMATIC... NOTHING TO PUMP  
Trico Products Corporation, Buffalo 3, N. Y.

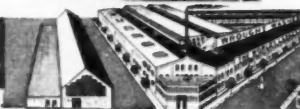


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Complete Information on  
**WASHERS and STAMPINGS**

Here's a pocket edition catalog made to order for those engaged in the selection and purchase of washers and stampings . . . forty-six fact-packed pages of worth-while descriptive material, including illustrations of many of the more than 22,000 dies available in our plant to save you unnecessary die charges and delay. Write for your free copy, today. It will be sent to you without cost or obligation. Ask for Catalog No. 20.



**WROUGHT WASHER MANUFACTURING CO.**  
The World's Largest Producer of Washers  
2212 S. BAY ST., MILWAUKEE 7, WIS.



**"What's so good about  
H-VW-M BUFFS?"**

RALPH R. GRANQUIST • District Manager • H-VW-M Chicago Office

**T**HAT'S a question customers frequently ask when I call to talk about H-VW-M electroplating and polishing equipment. My answer is this:

"H-VW-M has been making and testing buffs of all types for more than 60 years. That means H-VW-M knows buff textiles, knows what grades serve best for composition conveyance, minimum raveling and abrasive wear—knows fabricating techniques thoroughly. But what's important, H-VW-M applies this knowledge to each buff it turns out.

"So, whether you specify Full Disc, Triplex or Pieced, you get the right buff for long wear and efficient service every time. In addition to a wide variety of job-designed sewings, all H-VW-M buffs are finished with our Red-E-to-Use face assuring perfect balance and requiring no initial raking.

"I like to tell my customers about H-VW-M's service too, which offers complete facilities for the study of buffing problems, resulting in dollar-saving solutions. Before leaving my customer, I always give him Bulletin BC-104. It's chock full of information on buffs. Ask your salesman for a copy or write to 'Headquarters.'"

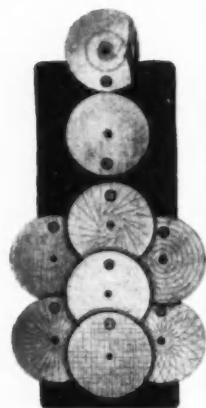


**HANSON-VAN WINKLE-MUNNING COMPANY**  
MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing equipment and supplies

Plants: Matawan, New Jersey • Anderson, Indiana

Sales Offices: Anderson • Chicago • Cleveland • Dayton • Detroit  
Grand Rapids • Matawan • Milwaukee • New Haven • New York • Philadelphia  
Pittsburgh • Rochester • Springfield (Mass.) • Stratford (Conn.) • Utica



"Hanson-Van Winkle-Munning has supplied the plating industry for over 70 years. Our sales-engineers are thoroughly familiar with every step in the process of electroplating and polishing. It is this overall knowledge that has made H-VW-M 'Headquarters' for electroplating and polishing equipment, supplies and technical assistance.



4875

cracks. Canning is qualified to mean that which is caused by too little or excessive pressure. The applied pressure is varied by adjusting the threaded stop (10), Fig. 5, either up or down in accordance with the requirements as shown by the dimpled Type B specimen. Cracks are determined both visually on production and internally on original machine certification and weekly thereafter.

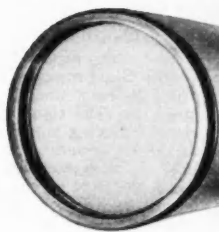
In establishing the original certification, the Type A specimen is used to seek out the correct heat. Several drilled specimens are pulled to get a rough value on what the actual load of the specimen is before dimpling. Then, an arbitrary machine setting is chosen and several dimpled specimens are made. These specimens are then pulled to determine which direction to go thereafter. If the specimen pulls short of the undimpled specimens, it is obvious that too much heat has been applied. If the specimen pulls above, too little heat has been applied, and the dimpling operation has work hardened the metal.

Next, thirty specimens are made with the machine setting established as before and pulled in a tensile testing machine. If the ultimate tensile strength of any of the specimens are appreciably low with a break around the periphery of the dimple, it is a good indication of insufficient heat. If the ultimate tensile strength of the specimen falls too low, breaking through the center of the dimple, and shows considerable necking around the dimpled area, it is an indication of excess heat.

If the Type A specimens are considered within range, two Type B specimens are made and inspected metallographically for internal shear cracks. The use of the Type A specimen has virtually eliminated the necessity for metallographic work because an internal shear crack has never been found when the procedure as previously outlined was used. Results are plotted on a quality control chart. Type B specimen is used daily for visual control of the dimpling process and Type A is used only for original certification and periodic checks of the machine.

**Cornell Air Lab Establishes  
Industry Research Group**

The Cornell Aeronautical Laboratory has announced the establishment of Laboratory Research Associates to enlist the support of aeronautical and allied industries in an expanded program of research and education in aviation. "The project will enable the laboratory to implement a two-fold program of developing new knowledge through research and of training engineers and scientists for significant roles in industry," declared Dr. Theodore P. Wright, president of the laboratory and vice president for research at Cornell University.



Spinning rings made by Pawtucket Spinning Ring Company of Central Falls, Rhode Island, being Homocarbured. Rings are formed either by forging or by automatic screw machine; after carburizing must be glass smooth with a .020"-.025" case and hardness of Rockwell 61C to 63C depending upon size of ring. Rings are not tempered; after leaving oil quench they are ready for polishing and shipment.



## *Parts Plant Saves Approximately \$60 Daily with Homocarb Heat Treatment*

Savings of approximately \$60.00 per day, or about \$22,500.00 in 18 months, followed the adoption of the Homocarb Carburizing process by the Pawtucket Spinning Ring Company, Subsidiary of Saco-Lowell Shops of Biddeford,

Maine. Most of the savings come from elimination of rejections due to distortion, these rejections being previously of no value.

Additional savings are realized because of the small amount of time required to load rings into the Homocarb plus the reduced cost per pound over pack carburizing.

In the Homocarb process, the four factors which determine the success of the carburizing treatment are under perfect control at all times. Each piece of material in the furnace is exposed to the same quality and quantity of gas, for any desired temperature and length of time. Because of this identical treatment, a uniform case results, which can be duplicated by any heat treater, day after day.

Adoption of the Homocarb process has resulted in hundreds of plants in lower operating costs and a consistently uniform product. There is a Homocarb furnace to fit your operation. For further information, write for Catalog T-623, or if your problem is specific, an L&N engineer will be glad to call. Leeds & Northrup Company, 4960 Stenton Avenue, Philadelphia 44, Pa.



Note small space required for these 3 Homocarbs and quench. Equipment's compactness and clean operation often leads users to put it directly in the production line.



MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

# LEEDS & NORTHRUP CO.

Jrl. Ad T-623(50)

AUTOMOTIVE INDUSTRIES, May 15, 1949

There's always a sure way  
to get it down!



.. give your customer the best!

If it were *absolutely necessary*, today's modern farmer could probably revert to the farming methods of his forefathers by using the simple tools of yesterday! Even though hand-sowing belongs to history, it's always a *sure* way to get the seed down!

Regardless of the percentage of mechanization on any farm, the annual operation depends on *good* equipment! With or without subsidies, no farmer pretends to like continual repair bills for unaccountable equipment breakage!

Efficient operation of the average farm depends on the working condition of *all* the equipment. With increased acreage being handled by fewer men, reliable equipment is an im-

portant item. The gang plow is useless without a good tractor, and plowing large acreage would be futile without a dependable drill or seeder to cover the same area in due time! Farm equipment *must* be made to take it... not built with inferior parts that only serve to lower the original cost and "hang" the upkeep!

Leading manufacturers of farm equipment are specifying *Unitcastings* for dependable parts... parts with "guts". Give your customer the best... build with *Unitcastings*!

Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio. Detroit Office: 701 New Center Bldg., Detroit 2, Mich. In Canada: Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

PRODUCTS LAST LONGER BUILT WITH STRONGER UNITCASTINGS

**UNITCAST**  
*Corporation*  
**ELECTRIC STEEL CASTINGS**

## Chris-Craft Production

(Continued from page 28)

the bearings are precision-bored.

An interesting variety of special materials is specified to prevent salt water corrosion and assure long life. For example, the propeller shaft is turned from K-Monel and heat treated for strength. The water tube which carries the cooling water from the pump at the lower end to the water jackets is of stainless steel tubing. The water pump, mounted on the propeller shaft, is of oscillating eccentric type, the movable member being made of molded Neoprene. The water pump seal in this assembly is of double-acting design and is made of Neoprene.

A molded rubber shock absorber element is assembled within the bore of the propeller hub. It is intended to re-shock if underwater obstructions are encountered.

Starter design also is said to be unique. Here they use a hardened three-lobe starter crab which engages three stainless steel balls, the latter being loosely mounted in individual cages. The cages or slides are inclined to permit the balls to drop into engagement when the motor is not running. As the motor is cranked and starts in rotation, however, centrifugal force immediately throws them outward and out of engagement.

At this point it may be noted that all aluminum turning, boring and milling is done at high speed with Carboly tools. For a variety of turning, facing and boring operations on many of the parts they use a battery of high speed 10-in. Monarch lathes, fitted with Carboly tools.

An innovation of interest is the development of a cold dip tank Aldine treatment for all parts which may be subjected to salt water. This simple immersion treatment not only inhibits salt water corrosion but provides an excellent paint receptive surface as well. It may be noted that all Aldine installations up to the present time have required heated solution tanks.

Motors are assembled on benches in the usual progressive manner. All moving parts are liberally lubricated at each assembly stage. Chris-Craft practice is to assemble the power unit without the tank and housings for the preliminary run. These sub-assemblies are tested in the water tank for a given schedule for break-in and initial check on performance and adjustments.

Then the motor is transferred to the assembly stands in the test department to complete the assembly. Finish-assembled motors are then returned to the test stand where they are subjected to a final run at 2000 rpm for one hour. As indicated in the specifications, they use the Scintilla magneto which is set to fire at 180 deg intervals. It is claimed that the motor will idle at 250 rpm continuously.



Never before...  
a Piston Ring  
so SURE to be

NEVER BEFORE could you be so *certain* of piston ring performance as with today's Pedrick piston rings.

Never before could you rely on such accurate fit . . . such uniform oil control . . . such long-lasting power.

Through a new, exceptionally precise method of quality control, *every* Pedrick ring now comes to you as fully tested and as perfect as if it had been made individually by the chemists, engineers, physicists and metallurgists themselves.

You are sure that each Pedrick ring is *metallurgically* correct . . . for Pedrick's new quality control system begins at the moment the metal is poured. It makes certain that only *good* castings leave the foundry.

You are sure that each Pedrick ring is correct in *dimensions* . . . for Pedrick's precise method of quality

control follows through at *every* stage of machining. With this new system, we are actually able to *see trends* in the performance of machine tools. Thus, we can detect and correct deviations before they would ever be revealed by ordinary inspection procedures.

**Results:** piston rings of *uniform* high quality . . . and piston ring performance of *uniform* excellence!

This development is important to every user of piston rings. Like "Heat-Shaping," it brings extra advantages . . . freedom from operating troubles . . . greater economies in oil and fuel . . . longer effective life. WILKENING MANUFACTURING CO., Philadelphia 42, Penna. In Canada: Wilkening Manufacturing Company (Canada) Ltd., Toronto. In Detroit, Michigan: 3075 Penobscot Building, Woodward 3-4110.

**Pedrick**

**"HEAT-SHAPED"  
PISTON RINGS**

For 29 Years, Supplier of Piston Rings to Leading Vehicle and Engine Manufacturers

# It doesn't pay to PINCH PENNIES



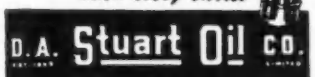
## on CUTTING FLUIDS

IN selecting cutting fluids, performance—not price—is the important factor. Savings pinched out in purchasing are often thrown out in the scrap pile. A large Milwaukee screw products company learned this in machining Type 304 stainless steel tube stock on a single spindle Cleveland Automatic, using Tantung high speed tools. Of several cutting fluids tried for this operation, D. A. Stuart's ThredKut 99 with paraffin oil was found to be the only one which would enable the shop to produce this job at a profit.

On the forming operation, ThredKut 99 permitted production of 500 to 600 pieces per grind, as compared to only 100 to 155 with other oils; on drilling 300 to 400 pieces with ThredKut 99, only 75 to 100 with other oils; and 22 pieces per hour average with ThredKut, only 8 with other oils!

You can't get around performance records like these. Cutting oil at any reasonable price is a sound investment when it pays off in longer tool life, increased production and desired finish. You can buy cheaper oils and more expensive oils, but in this case as in most others, it is wise economy to buy the Stuart oil best suited for the job. Write for booklet, *Cutting Fluids for Better Machining*.

STUART service goes  
with every barrel



2733 South Troy Street, Chicago 23, Ill.

## AIRBRIEFS

(Continued from page 44)

### Return to Normalcy

Just when wind tunnel experts had finally accustomed the aircraft industry and large segments of the public to the fashionable new "swept" wing, they are now indicating that for really high-speed flight, the old-fashioned straight wing may be best. Scientists of the National Advisory Committee for Aeronautics report that for flight at speeds of Mach number 2.5 and higher, a straight wing with thin airfoil having sharp leading edge shows promise of superior performance to the swept wing. Engineers have long favored the swept wing for its drag alleviating qualities, rather than intrinsic drag reduction abilities, and once the craft is well into the supersonic regime, it loses its advantage over the straight wing. Structures men are already critical of the tendency of the swept wing to load up its rear spar near the root, and aerodynamicists decry its geometric habit of changing the angle of incidence along the span under aerodynamic load. The straight wing suffers little from either of these failings, and if metals and design can solve the basic problem of thinness, then the familiar layout with the wing normal to flight path will return for very high speeds.

### Air Power Cost

The Navy was considered vulnerable on the estimated \$188 million cost of the 65,000-ton carrier, but Secretary of Air Force Symington let the cat out of the bag the other day when he revealed that the first Convair XB-36 cost \$4 million for the airframe alone, the first production group \$1.9 million each and the current production group \$1.4 million each. Air Force has already ordered a total of 170 B-36's and hinted broadly that it had a purchase order already drawn up for 11 more. Even at the lowest figure, this means \$253,400,000 for the fleet of airframes plus this figure again for engines, armament and equipment. While we hold no special brief for either weapon, leaving that up to the Pentagon for decision, we do feel that the cost of the carrier was beside the point. Both weapons cost plenty, and a recent highly-publicized magazine article indicated that the production atomic bombs cost \$1 million each. We wonder just how many \$4 million weapons we could launch at the enemy every day before the country went broke!

### Lean Days Fat

It is a curious relief to learn that our aircraft company presidents are now no longer living on starvation wages as they did for many years. (Turn to page 108, please)



## 100% more pull per unit size

We're dependent upon mechanical muscles in the form of solenoids activated by automatic or finger-tip control. But there's a limit to the amount of work even mechanical muscles can do. That limit is set by restrictions on size or weight and by the heat stability of the insulating materials used in winding the coil.

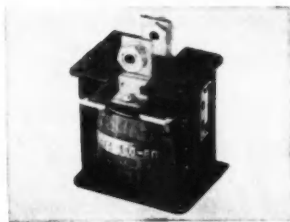


PHOTO COURTESY B. W. CONTROLLER CORPORATION

Silicone insulated "Hi-Power" small space solenoids operate continuously in either 25 cycle 110 to 220 volt or 60 cycle 110 to 550 volt service.

Use of heat-stable Silicone insulation has enabled engineers at B/W Controller Corporation of Birmingham, Michigan, to give you almost twice as much power without increasing the size or weight of their small space solenoids. For example, the new B/W "Hi-Power" solenoid has a push or pull of 32 pounds at 100% voltage compared with 17-18 pounds for a comparable Class "A" solenoid.

This increase in power per unit size is made possible by the exceptional heat stability of Dow Corning Silicone Insulation. This new class of electrical insulation gives long and continuous service at temperatures in the range of 200-260° C. "Hi-Power" solenoids operate continuously in 25 cycle 110 or 220 volts as well as in 60 cycle service up to 550 volts. DC Silicone insulation also assures efficient operation in spite of high ambient temperatures.

And Dow Corning Silicone electrical insulation gives you more power per pound in other kinds of electrical equipment including motors, transformers, and generators. For more information, call our nearest branch office or write for our new collection of case histories on Silicone Insulation, pamphlet No. G7M2.

### DOW CORNING CORPORATION MIDLAND, MICHIGAN

Atlanta • Chicago • Cleveland • Dallas  
New York • Los Angeles  
In Canada: Fiberglas Canada, Ltd., Toronto  
In England: Albright and Wilson, Ltd., London





Unfrightened by dire predictions, leaders of American business always have planned with confidence in the future . . . and, in the long run, their faith has paid off. Such courageous leadership helps to *create* good business.

Good business means jobs for those who want to work. It's the best defense against the termites who are working to undermine the individual liberties Americans enjoy.

6593

**SKF**  INDUSTRIES, INC. PHILADELPHIA  
BALL and ROLLER BEARINGS

**WHAT EVER  
YOU NEED!**

## SPRING STAMPINGS

**FROM STOCK  
WHEN YOU WANT THEM**

Flat springs and spring washers in whatever size or finish you need. Diamond G facilities can produce them . . . and at prices usually far below your own production costs.

That's why many manufacturers "Go To Garrett's" for all small parts. Our experience has been so voluminous in producing small parts and our variety of dies and tools so extensive that most springs can be produced to fit your requirements without extra expense of special equipment.

If it's small parts you need . . . let Garrett's make them for you . . . better, quicker and at lower costs. You'll also find it worthwhile reading our new engineering catalog which shows hundreds of standard spring washer items now in stock or manufactured as standard products. Write for your free copy today . . . Catalog No. 55 51.

**DIAMOND G PRODUCTS**

Manufactured by  
**GEORGE H. GARRETT CO., INC.**  
1421 Chestnut St., Phila., Pa.

**GARRETT**

MANUFACTURERS  
OF SMALL PARTS

Latest reports indicate that Donald Douglas drew \$96,500 (plus \$13,021 retirement) during 1948; Glenn L. Martin \$60,460 (plus \$15,568 retirement); and LeRoy Grumman \$50,350 (plus \$9832 retirement). Of course, their second-men didn't do badly either: L. A. Swirbul \$60,350 (plus \$10,295 retirement) (Grumman); F. W. Conant (Douglas) \$43,400 (plus \$2750 retirement); and Harry Rowland (Martin) \$40,449 (plus \$7250 retirement). It's a little difficult now to sell the industry as the "poor cousin" in the nation's industrial arsenal. But it's a relief to know that at the end of this long road that is, indeed, a reward for its pioneers.

## Magnetometer

(Continued from page 41)

the disk is released at any position it will rotate of its own accord to a particular position and come to rest. In most sheet steels there are two such stable positions, one parallel to the direction in which the sheet was rolled and the other at right angles to this direction.

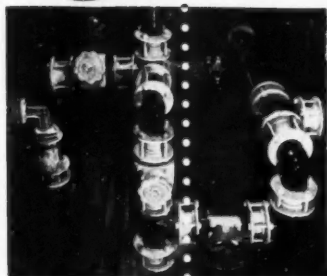
The reason for this behavior is that minute crystals of iron of which the sheet is composed have certain directions in which they are easily magnetized. When placed in a magnetic field the crystallites tend to turn the disk so that one of these directions is parallel to the field.

If these preferred directions in the crystallites were uniformly distributed in all directions, they would compete with each other, and there would be no torque on the disk. But in almost all kinds of sheet steel these preferred directions are more or less concentrated about certain directions in the sheet. As a result, some of the crystallites co-operate to rotate the disk in the magnetic field. The greater these concentrations the greater will be the resulting torque.

Beneath the sample and attached to its mount is a strain gage which measures the twist toward the preferred direction of the sample's magnetic particles. The measurements are translated automatically by a moving pen from the gage to the chart paper of a recorder.

If parts such as fenders are to be formed, steels with little magnetic directional properties are preferred. Fig. 1 shows the magnetic torque of a steel of this type plotted versus sample orientation. If the steel being tested is of a composition high in silicon and is to be used to make cores for transformers, a strong directional indication is preferred as shown in Fig. 2, but minimum directional properties in the same type of steel are desired for the construction of electric motors and generators.

Now you can  
**FORGET ABOUT  
Corrosion**



on . . .

Make your process equipment of HAVEG—and you can forget about corrosion! HAVEG is a different molded structural material that resists chemical action through its entire mass. Not just a lining or coating, its utility is not affected by surface gouges and abrasion. Moreover, HAVEG

**PIPE, VALVES**

**FUME DUCTS**

**AGITATORS**

**BLOWERS**

**FITTINGS**

**TOWERS**

**PIPING**

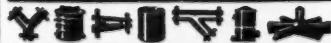
**PUMPS**

**TANKS**

is strong. It resists shock. And it is remarkably easy to machine!

Standard items such as pipe, fittings, etc. can be shipped to you right from stock . . . specially designed and built tanks, and other "custom-built" equipment, will be delivered in just 4 weeks or less! So get your order in today—or write for the engineering bulletin E-5, today.

**HAVEG**  
**CORPORATION**  
NEWARK 2, DELAWARE



CHICAGO 11 CLEVELAND 4 HARTFORD HOUSTON 6 DETROIT 11 LOS ANGELES 13 SEATTLE

# For Outboards, Too . . .

## MALLORY TUNGSTEN CONTACTS

### *Guarantee Longer Life*



In a modern outboard motor the contacts in the magneto-type ignition system make and break 4,000 times a minute!

Contacts have to be tough to stand that gaff. Those contacts have to be made of material with extraordinary wear-resistance.

The tough, interlocking grain structure of Mallory Tungsten Contacts—that keeps down erosion throughout long periods of service—is the result of the most rigid processing controls. Mallory Tungsten Contacts—like all Mallory Contacts—are manufactured to a most exacting standard.

#### ***What's Your Problem?***

Mallory makes contacts for every need—from those used in tiny motors for electric razors to activating street lighting systems. Mallory has designed so many types that even if you have an unusual problem, you'll probably find a standard Mallory Contact to handle it. If not—Mallory engineers are equipped to develop one for you. Consult them now.

*For all kinds of contact materials and service, you can't beat Mallory as a dependable, experienced source.*

In Canada, Made and Sold by Johnson, Matthey & Mallory Ltd., 110 Industry St., Toronto 15, Ontario.

### **Electrical Contacts and Contact Assemblies**

**P. R. MALLORY & CO. Inc.**  
**MALLORY**

**P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA**

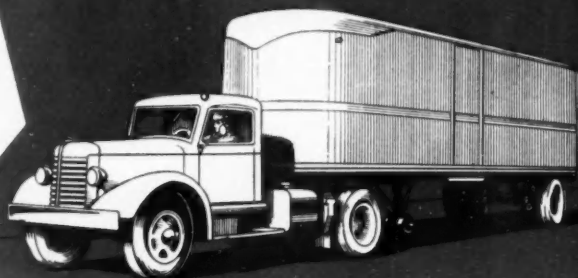
#### **SERVING INDUSTRY WITH**

Capacitors	Rectifiers
Contacts	Switches
Controls	Vibrators

Power Supplies

Resistance Welding Materials

**THIS TRUCK  
ELIMINATED  
28 POUNDS of  
DEADWEIGHT**



**By USING This  
MECHANICS  
34% LIGHTER  
JOINT**

Not much, you may think. But, if you consider that those 28 pounds of DEADWEIGHT might have been carried 300,000 — 400,000 or 500,000 miles needlessly, QUITE A LOT! Why make your trucks haul unnecessary, non-profit-earning DEADWEIGHT that reduces the PAY-LOAD part of their legal gross poundage? MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFTS are made 34% lighter, run smoother and place

much less load on transmission and pinion bearings — without loss of torque. Let our engineers help add to the ton-mile capacity of your trucks by specifying weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT applications.

**MECHANICS UNIVERSAL JOINT DIVISION**

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

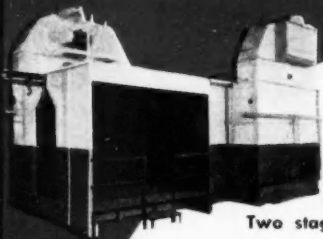
**M E C H A N I C S**

*Roller Bearing*



**UNIVERSAL JOINTS**

**For Cars • Trucks • Busses and Industrial Equipment**



## spray painting

Two staggered high exhaust Hydro Whirl spray booths used in painting of automobile hoods and fenders—note centrifugal fans contained in exhaust plenums.

## flo-coating

A small manual paint flow-coating unit in the plant of a farm equipment manufacturer—part of a system employing power and free conveyor and drop section cleaning position.



## rust proofing

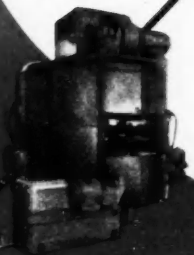
A 5 stage combination gas-oil fired tunnel type U-shaped Spra-Bonderizing\* machine—part of a metal sash finishing system.

Trade mark—Parker Rust Proof Co.

# Complete finishing systems

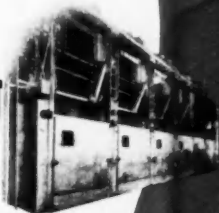
## washing

A 12 position rotary indexing power spray-washer recently developed for preparing inside surface of television tubes—entire unit wholly safeguarded.



## baking

Battery of large direct gas fired batch-type core baking ovens in large midwestern foundry—heaters located on overhead platform.



**ENGINEERED  
to YOUR  
particular NEEDS**

**A**LTHOUGH all the components shown above have their own particular design criteria—many problems enter into their assembly into a COMPLETE FINISHING SYSTEM—loading stations, methods of handling, cooling times, manual and automatic transfers are but a few of these problems. We are particularly proud of our ability not only to design and manufacture the units but to combine them into well functioning systems.

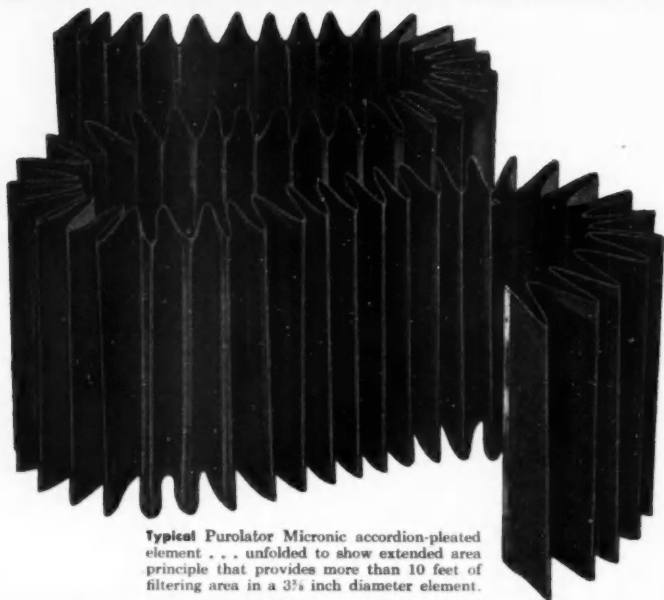


*For Finer Finishing Equipment—In Any Industry—It's*

# PETERS-DALTON Inc.

17030 RYAN ROAD • DETROIT 12, MICHIGAN



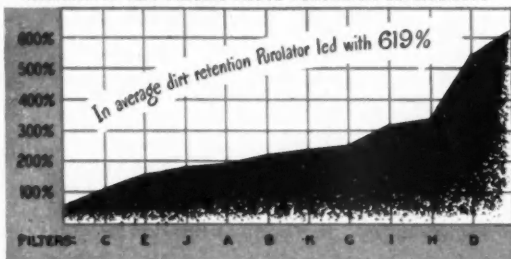


Typical Purolator Micronic accordion-pleated element . . . unfolded to show extended area principle that provides more than 10 feet of filtering area in a 3½ inch diameter element.

## Sidetracks over 200% more abrasives...

because it filters *micronic* particles ... has 5 times greater filtering surface

### COMPETITIVE TEST RESULTS PROVE PUROLATOR SUPERIORITY!



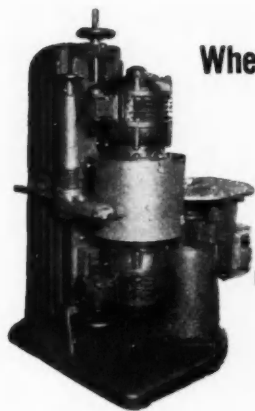
● This revolutionary accordion-pleated *micronic* element explains why you give engines *greater protection* from abrasives when you specify a Purolator Micronic Filter.

And better protected engines are sure to get greater acceptance from your prospects.

Because Purolator removes *all* the abrasives from the oil stream . . . it saves wear on pistons, bearings, cylinder walls and other vital parts. Yet it *leaves* in the oil any additives placed there for greater lubrication efficiency. Other types of filters often remove these important additives.

We invite you to consult our highly experienced engineering staff about your specific filtering problem . . . and to write for any additional data and technical information you may want on the Purolator Micronic Oil Filter.

**PUROLATOR PRODUCTS INC.,**  
Newark 2, New Jersey and  
Windsor, Ontario, Canada



No. 902 Besly Vertical Spindle Grinder for small coil springs, carbon brushes, ceramic parts, etc. Handles up to 4000 pieces per hour —  $\frac{1}{8}$ " to 1" O.D. and from  $\frac{1}{4}$ " to 4" long.

When It's a Matter of Grinding Springs and Small Parts...

# Only BESLY

## Offers This Complete Line of Production Grinders

Whatever the job specifications may be, there's sure to be a Besly Grinder that will do the work faster on closer tolerances — *with greater economy*. Sizes range from those that handle the smallest parts to large capacity units for grinding railroad car springs and similar large pieces. Fourteen different types are available to select from. Besly engineering adapts basic models to specific requirements of the user. Versatility in doing many grinding jobs well is characteristic of Besly Grinders. Conversion from one job to another is quickly made by easy replacement of the work holder.

*Simplify production! Cut job costs! Talk over your requirements with a Besly engineer. Besly Grinders earn their way with savings of time, labor and material.*

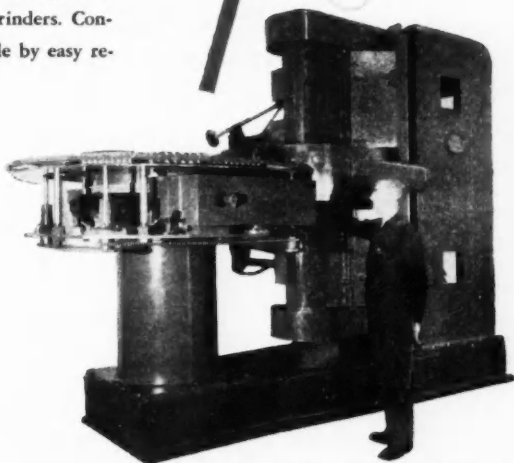


### TITAN WHEELS

Write today for this helpful booklet which offers useful facts on abrasive wheels... It's free. Contains much valuable data on grinding wheels and abrasives. Learn how Besly-Titan Steelbacs cut "down time" and boost output.

14

BASIC MODELS  
Proved in Use



No. 926—53" Besly Double Spindle Vertical Grinder with power driven rotary fixture and multiple station feed wheel. Tooled for coil springs  $\frac{1}{4}$ " to 6" long—800 to 1500 per hour.

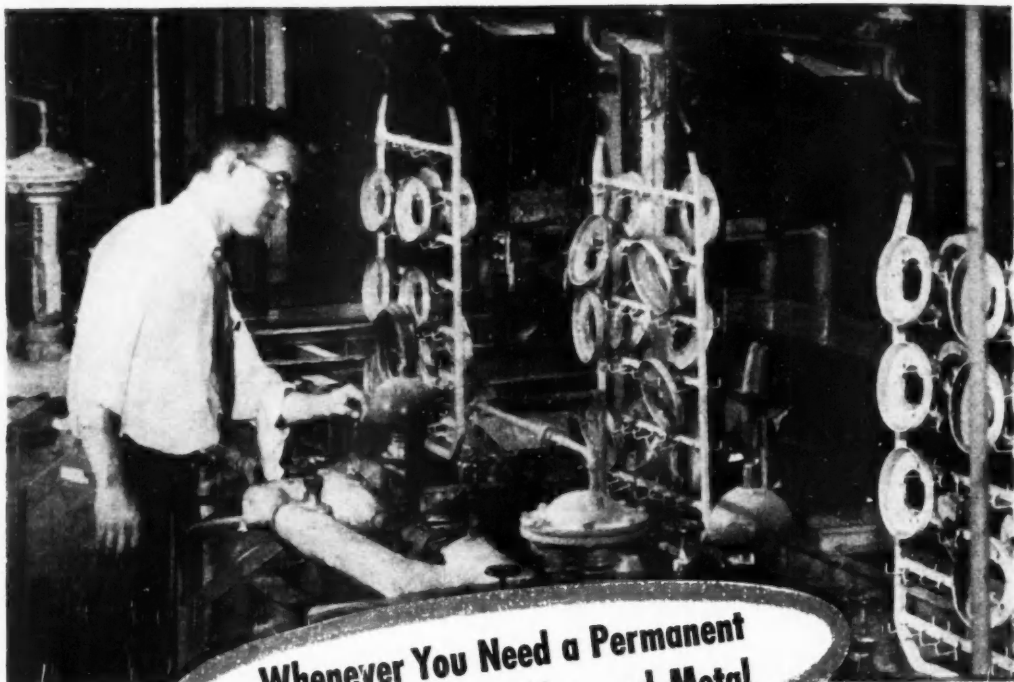
Maybe GRINDING is the Better Way . . . Better Check with

**BESLY GRINDERS AND ACCESSORIES  
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS**

**BESLY**

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street, Chicago 6, Illinois

Factory: Beloit, Wisconsin



Whenever You Need a Permanent  
Bond Between Rubber and Metal

## "BRASS-O-MATIC" is the answer

The "Brass-o-matic" process is just one of the scientific operations U. S. Rubber uses to help you make today's cars and trucks ride more smoothly and silently.

This unique system of brass-plated adhesion results in a permanent bond between the metal and the rubber . . . and only U. S. Rubber offers "Brass-o-matic."



This technique of bonding rubber to metal was developed by U. S. Rubber Engineers, work-



ing closely with Automotive Engineers. Today, the U.S. technical team can help you on a wide variety of problems involving noise, vibration and wear—by means of rubber-to-metal and all rubber parts. This team consists of chemists, physicists, metallurgists and design engineers.



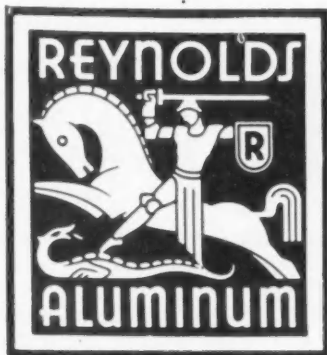
Just call or write, United States Rubber Company, Engineered Rubber Products Division—Fort Wayne, Indiana or 5850 Cass Avenue, Detroit.

**ENGINEERED RUBBER PRODUCTS  
FOR THE AUTOMOTIVE INDUSTRY**

MADE AT FORT WAYNE BY

**U.S. RUBBER**  
SERVING THROUGH SCIENCE

UNITED STATES  
RUBBER COMPANY



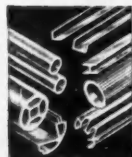
# FAST SERVICE FROM DISTRIBUTOR WAREHOUSE STOCKS

Aluminum in less-than-carload lots is available with speed and with many helpful services from the qualified metal distributors listed below. Reynolds technicians, in offices across the country, work closely with these distributors on special problems. Together they can bring all the advantages of Reynolds *Lifetime Aluminum* to your products and production, just as they are helping metal fabricators everywhere in their conversion to this modern, lightweight metal.

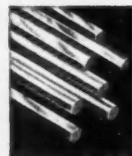
Consider aluminum . . . consult your Reynolds Distributor.



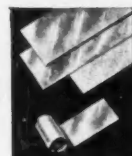
Wire, Rod and Bar



Extrusions Structural



Screw Machine Stock



Coil, Sheet, Plate Plain & Embossed



## REYNOLDS DISTRIBUTORS HAVE ALUMINUM MILL PRODUCTS FOR IMMEDIATE DELIVERY FROM WAREHOUSE STOCKS

**ALABAMA**  
Arnold-Brown Metals & Supply Co., Birmingham 5

**CALIFORNIA**  
American Brass & Copper Co., Oakland 7  
(Wire, rod, bar, structurals only)  
Richard G. Stern & Company, Los Angeles 46  
Tay-Hallbrook, Inc., San Francisco 1  
United States Steel Supply Co., Los Angeles 54 and San Francisco 1  
Western Metal Supply Company, San Diego 12

**COLORADO**  
Marsh Steel Corporation, Colorado Springs and Denver 5

**FLORIDA**  
Horne-Wilson, Inc., Jacksonville 6, Orlando, Miami 26 and Tampa 1

**IDAHO**  
Idaho Steel Products, Inc., Boise

**ILLINOIS**  
United States Steel Supply Co., Chicago 4  
Benjamin Wolf & Company, Chicago 36

**INDIANA**  
Brass & Copper Sales Co., Indianapolis, 4

**LOUISIANA**  
Stauffer, Eschleman & Co., Ltd., New Orleans 1

**MARYLAND**  
Clendenin Bros., Inc., Baltimore 2  
(Wire, rod, bar, structurals only)  
Lyon, Conklin & Co., Inc., Baltimore 30

**MASSACHUSETTS**  
Bay State Refining Company, Chicopee Falls (ingots only)  
Arthur C. Harvey Company, Boston 34  
Pratt & Inman, Worcester 8  
(Wire, rod, bar, structurals only)

**MICHIGAN**  
Kaslo Steel Corporation, Detroit 9

**MINNESOTA**  
Newell T. Miner Company, St. Paul 4

**MISSOURI**  
Brass & Copper Sales Co., Kansas City 6 and St. Louis 2  
Marsh Steel Corporation, N. Kansas City

**NEW JERSEY**  
Edgcomb Steel Corporation, Hillside

**NEW YORK**  
Beatt, McCarthy & Rogers, Inc., Buffalo 5

**OHIO**  
Hamilton Steel Company, Cleveland 8  
Summer & Company, Columbus 8

**OREGON**  
American Steel Warehouse Co., Portland 14

**PENNSYLVANIA**  
Levinson Steel Sales Company, Pittsburgh 19  
Potts-Farrington Company, Philadelphia 7

**TEXAS**  
Marsh Steel Corporation, Dallas 10  
Mancini-Lenoir Manufacturing Co., Dallas 1 and Houston 1

**UTAH**  
Salt Lake Hardware Company, Salt Lake City 9


**WASHINGTON**  
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## DISTRIBUTORS of REYNOLDS ALUMINUM

REYNOLDS METALS COMPANY • LOUISVILLE 1, KENTUCKY

THE COMPANY'S OFFICE IN EACH STATE HAS METAL STOCKS ON HAND. PARTS OFFICES IN PRINCIPAL CITIES • LISTED UNDER "ALUMINUM" IN YOUR CLASSIFIED PHONE BOOK



# **SAGINAW**

for Quality and Quantity  
**IN STEERING GEARS**

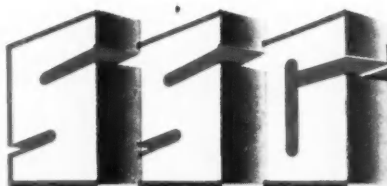
Whatever your steering requirements, no matter how exacting—for passenger cars or busses, trucks or farm tractors—you can depend on Saginaw Steering Gear Division to meet your needs. And whatever type of steering you choose, you can obtain it in the right ratio and the right capacity to suit the vehicle and its load.

Saginaw's long record of successful specialization in steering gear engineering and manufacturing is your assurance of quality . . . and Saginaw's greater production capacity is your assurance of quantity, an unfailing supply to meet your production schedules.

### **There's a Saginaw Steering Gear That Exactly Suits Your Needs**

Saginaw, long a leader in improving conventional steering gears and in developing new and advanced types, offers a complete range of ratios and capacities, in the type that best suits your needs.

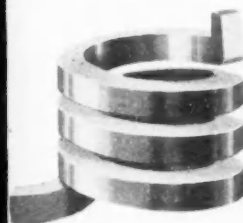
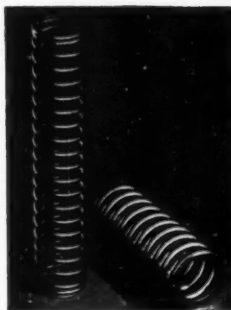
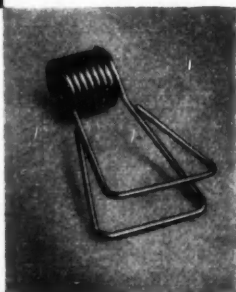
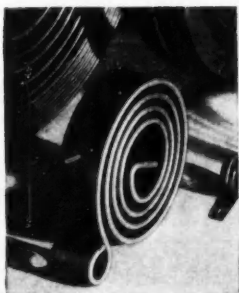
- Hydraulic Power
- Recirculating Ball
- Roller Tooth
- Worm and Sector



**PRODUCTS**

**Saginaw**  
STEERING GEAR DIVISION

STEERING GEAR ASSEMBLIES • STEERING LINKAGE ASSEMBLIES  
PROPELLER SHAFTS • DIESEL ENGINE AND AIRCRAFT PARTS



*Why you should use*

## American Quality Springs

**"SPRING PERFORMANCE"** — there are two words that actually can make the difference between your product's success and its failure.

When the springs in your product *don't* perform as expected (whether you're making an expensive piece of equipment or just a handy gadget) the chances are that you're going to be confronted with headaches, a dent in your reputation and perhaps the loss of some valuable repeat business.

We don't claim that American Quality Springs have never failed. *Anything mechanical can break down.* But we *do* claim that our springs have an outstanding reputation for faithful performance.

An American Quality Spring was the answer to a troublesome vibration problem in a well-known make of washing machine. American Quality Springs played an important role in the success of an experimental sound room. They are helping to keep thousands of watches accurate. And they are playing key roles in the success of farm equipment . . . business machines . . . and even in toys for America's youngsters.

Yes, American Quality Springs are well-known for doing the job — dependably and economically. Our engineering staff — our production and testing facilities are at your service to supply you with the springs that will do the job for you.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS

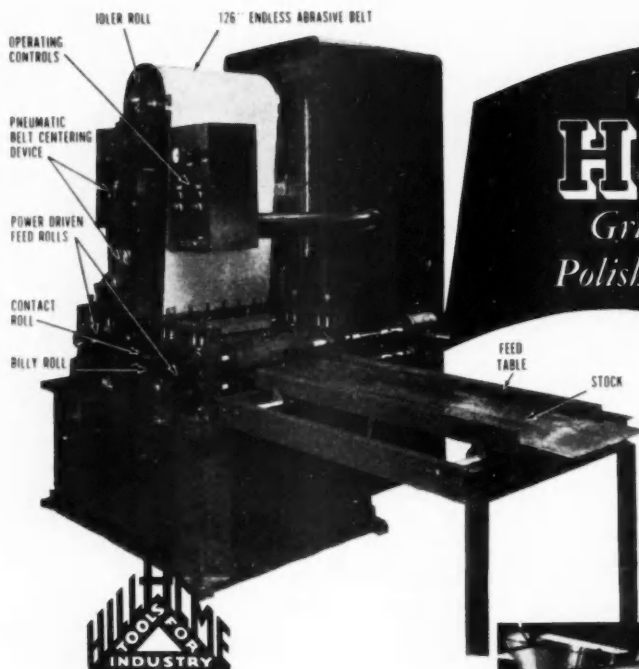
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK



## AMERICAN QUALITY SPRINGS

UNITED STATES STEEL



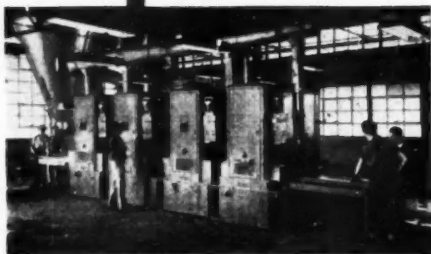
The new  
**HILL**  
 Grinding and  
 Polishing Machine

Illustrating salient features of "Hill" 2-Roll Vertical Abrasive Belt Pinch Roll Type Grinding and Polishing Machine (with cover removed).

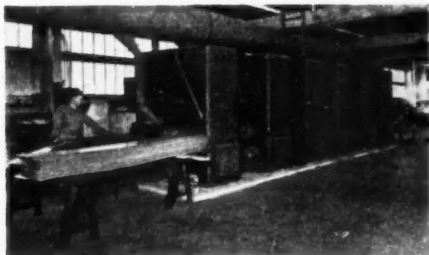
• A large number of these new "Hill" Grinding and Polishing Machines with power driven feed rolls are in use today for pre-finishing, conditioning and salvaging operations of *flat* sheets, plates and blanked shapes. These machines may be used as individual units or in synchronized multiple stage assemblies for continuous line finishing prior to forming. They are manufactured in various widths up to 72".

"Hill" Abrasive Belt Grinding and Polishing Machines are also furnished in two other types, i.e., Hydraulic Reciprocating Table Type for individually processing sheets and plates of ferrous or non-ferrous metal, and the Strip Type for conditioning strip material in coil form.

Our Engineering Staff will cheerfully aid you in selecting suitable equipment for your requirements. Send for illustrated bulletin.



Southern Ohio Automotive Industry manufacturer says, "Vastly improved quality".



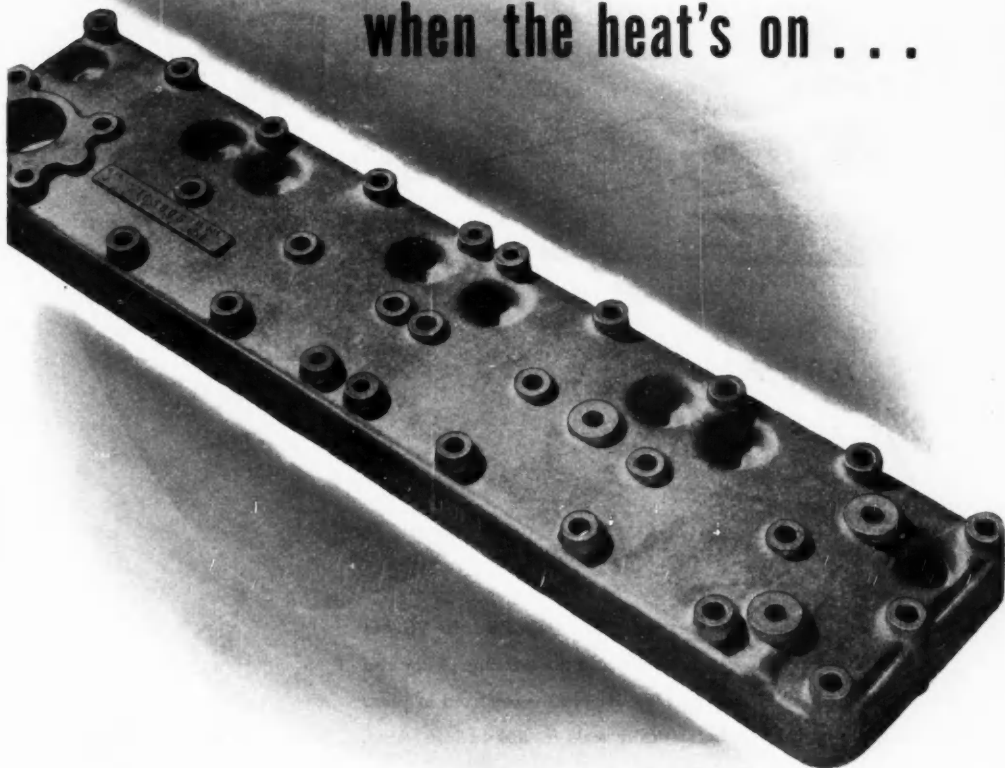
Automotive Industry manufacturer in California says, "Greatly increased production".

# THE HILL ACME COMPANY

6400 BREAKWATER AVENUE • CLEVELAND 2, OHIO

"HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING  
 THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

# Keep a cool head when the heat's on . . .



Equip your engines with aluminum cylinder heads, cast by Alcoa. They don't develop hot spots because aluminum conducts heat twice as fast as cast iron. Heat is distributed evenly. You get pingless power—quick, smooth acceleration.

Aluminum cylinder heads give you the same bonuses that come with other aluminum parts, cast by Alcoa—such as intake manifolds,

pistons, torque converters, brake shoes. These bonuses include *light weight* that results in twice as many parts per pound as with heavy metals; machinability that speeds production.

Look into the economies and engineering advantages of Aluminum Castings by Alcoa. ALUMINUM COMPANY OF AMERICA, 2110 Gulf Building, Pittsburgh 19, Penna.

## ALCOA FIRST IN ALUMINUM



INGEST • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS  
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

## WITH THE *NEW* HOUDAILLE\* VISCOUS DAMPER



● Houdaille engineers have redesigned and improved the Viscous Torsional Vibration Damper by producing the housing, pulley and hub as a single *piece*. The cover plate is permanently fixed in place by a new method which hermetically seals the finished assembly.

The elimination of riveting and welding has added strength to the unit, while the design does away with wobble and ride out common in assembled pulley and hub construction. Precision manufacturing insures uniform performance and a rigid adherence to specifications.

This new Houdaille Viscous Damper has been thoroughly proven both in the laboratory and field. As never before, it offers you the best means of minimizing torsional, crankshaft vibration. We will be glad to place full information in your hands.

*An exclusive development of Houdaille-Hershey Corporation, patents pending.*



*\* Say  
Houdaille*

**HOUDAILLE-HERSHEY CORPORATION**

HOUDAILLE ENGINEERING DIVISION  
BUFFALO 11, NEW YORK

America's Pioneer Builder of Hydraulic Shock Absorbers

# Take

## Fuel Pumps, for instance



- AIRCRAFT SPARK PLUGS
- AIR CLEANERS
- AMMETERS
- CARBURETOR INTAKE SILENCERS
- CARBURETOR INTAKE SILENCER AND AIR CLEANERS
- CRANKCASE BREATHERS
- CRANKCASE VENTILATION VALVES
- DIE CASTINGS
- DIE CASTING MACHINES
- BACK FIRE DEFLECTORS
- FLEXIBLE SHAFT ASSEMBLIES
- FUEL OIL FILTERS
- FUEL PUMPS
- FUEL AND VACUUM PUMPS
- GASOLINE GAUGES
- GASOLINE STRAINERS
- IGNITION CABLE TERMINALS
- INSTRUMENT PANELS
- LUBRICATING OIL FILTERS
- AIR GAUGES
- OIL GAUGES
- RADIATOR PRESSURE CAPS
- REPLACEABLE AIR CLEANER ELEMENTS
- AUTOMOTIVE SPARK PLUGS
- SPARK PLUG CLEANERS
- SPARK PLUG GAPPING TOOLS
- SPARK PLUG TESTERS
- SPEEDOMETERS
- SPEEDOMETER AND TACHOMETER DRIVE ADAPTERS
- TACHOMETERS
- THERMO GAUGES
- VACUUM PUMPS
- VOLTMETERS

● If you need a fuel pump for the engine you're building, AC will probably be your most economical source—for a reason that may surprise you. AC builds, or has built, over 900 different adaptations of the same basic design. Over 250 of these are combination fuel and vacuum pumps.

Isn't it logical that you stand an excellent chance of finding exactly the pump you need among these 900?

And, if you do, you save all the tooling and other costs which go with custom designing and construction.

Because of AC's large volume on other products—such as spark plugs, instruments and panels, air cleaners, etc., you will find a similar situation with them.

For full information, contact any of the offices listed below.



West Foundation Building  
Flint 3, Michigan

General Motors Building  
Detroit 2, Michigan

Lincoln Tower Building  
Chicago 1, Illinois

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION



## MISTER, YOU MEAN TRU-LAY PUSH-PULL

● Here is the best answer to many knotty problems in automotive, aircraft and other machine design. TRU-LAY PUSH-PULL...

- ... transmits reciprocal action like a solid rod, yet is flexible as wire rope
- ... will operate over long or short lengths, with few or numerous bends
- ... will operate while flexing
- ... is made in capacities up to 1000 pounds input
- ... is precision-made, assuring minimum backlash and long life



- This is a descriptive folder about TRU-LAY PUSH-PULL. If you do not have a copy, write our Detroit office. Just ask for **DH-87**.

**ACCO**

6-235 General Motors Bldg., Detroit 2 • 1119 Santa Fe Avenue, Los Angeles 21 • Bridgeport, Conn.



*In Business for Your Safety*

**AUTOMOTIVE AND AIRCRAFT DIVISION  
AMERICAN CHAIN & CABLE**

# Odom Here Non-stop From Hawaii; A Flies 5000 Miles for New Record

Lands His Small Plane at  
Teterboro in 36 Hours—  
Alone at Controls.

IS WELCOMED AT CITY HALL

Greeted at Field by Crowds,  
Including Fiancee, Who  
Flies to Meet Him.

Capt. William P. Odom,  
29-year-old career pilot,  
brought his little monoplane  
to a perfect landing at 12:05  
P. M. today at Teterboro Air  
Terminal four miles south of  
the city.

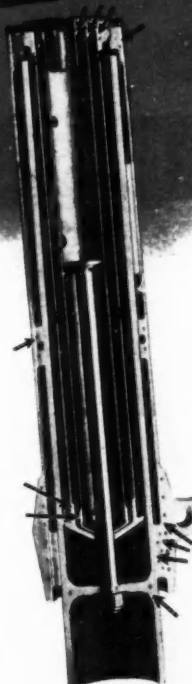


## ON EASY-FLO BRAZED LANDING GEAR

... And that perfect landing brought to a safe conclusion an amazing achievement. Beech Aircraft Corp. may well be proud of this outstanding testimonial to their able engineering and faultless fabrication—the more so because this was not a specially constructed plane, but their regular Model 35 "Bonanza."

The strength and dependability of the EASY-FLO brazed landing gear are well established, for Beech has been using this type of construction for some years—not only on landing gears but on various other parts as well. They are enthusiastic about results they get with low-temperature EASY-FLO silver alloy brazing and have expressed appreciation for the help and cooperation received from Handy & Harman. That help and cooperation are available always to all who have metal joining problems.

FOR THE FULL EASY-FLO BRAZING STORY  
write today for Bulletin 12A and a copy of the article "DESIGN  
AND PRODUCTION CONTROL OF SILVER ALLOY  
BRAZED JOINTS IN AIRCRAFT STRUCTURES."



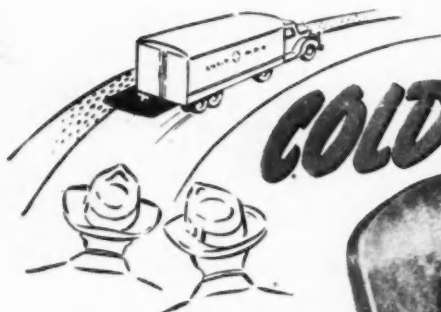
Vertical section through hydraulic shock strut of landing gear. Arrows point to EASY-FLO brazed joints. There are 39 such joints in the Bonanza's 3 landing gears—also 6 on control column and 2 on nose gear shimmy dampener. Stainless steel prop tips and various other parts are also brazed with EASY-FLO.

### HANDY & HARMAN

82 FULTON STREET

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Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada  
Agents in Principal Cities



# COLD RIVETED

no question about

## Strength!

YOU know the joint is tight... strong... SAFE!—when it's COLD RIVETED with a Hannifin "HY-POWER" Hydraulic Riveter. Doubts about the effects of vibration, stress fatigue, and embrittlement vanish. Anyone, with little or no experience, can turn out perfect work hour after hour at high rates of production with effortless ease. Faulty workmanship ceases to be a hazard. Let Hannifin help you use this efficient, modern, low cost production method. Recommendations on request.

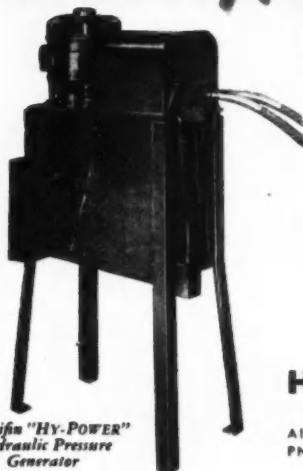
*Right*—Cold riveting main members of frame for giant truck trailer in plant of one of America's leading manufacturers.



# HANNIFIN

# Hy-Power

# RIVETERS



Hannifin "HY-POWER"  
Hydraulic Pressure  
Generator

**LAWN MOWERS TO CAR FRAMES.**—Whether you are riveting lawn mower blades or railroad car frames, there is a unit to handle your job better, faster, and cheaper. The Hannifin line is complete. Standard portable yoke riveters from 7½ to 100 tons, or more.

**PORTABLE, BALANCED!**—Perfectly balanced, easy-moving yokes. Compact, portable, "HY-POWER" pressure generators. Simple connections. Units furnished complete. **READY TO GO TO WORK.**

**NOISELESS "HYDRAULIC SQUEEZE" ACTION.**—Smooth, fast, precision-controlled power at your finger tip—thanks to Hannifin's *exclusive* "HY-POWER" pressure generator design. No complicated electrical circuits; no relays. All-mechanical positive action. Simple pressure adjustments. **SEND FOR COMPLETE INFORMATION.**

## HANNIFIN CORPORATION

1101 S. Kilbourn Avenue Chicago 24, Illinois  
 AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES  
 PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES  
 Nationwide Sales and Service

# RUST

**-the  
fight  
against  
it  
never  
ends!**

## **HERE'S NEWS ABOUT TWO FAMOUS FIGHTERS:**

They've come through three wars, and are now revamped to meet peace-time needs—still urgent, because the ravages of rust never cease unless metal is protected. The two famous names in rust preventives are:

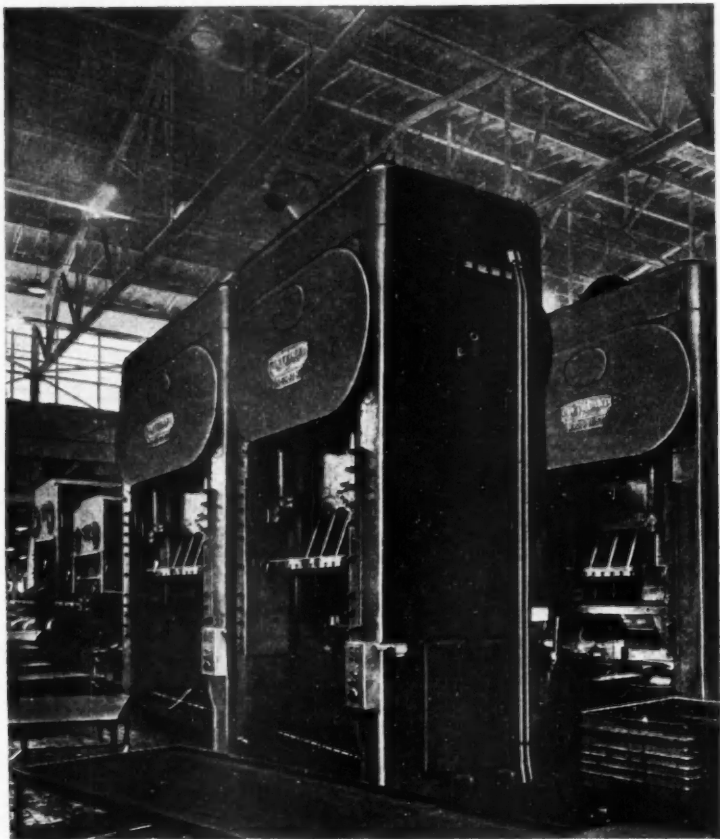
**COSMOLINE**—a brand first registered in 1881 and still being used for many types of Houghton rust preventives. This name is now being particularly applied to products meeting government specifications. There's a new Cosmoline to meet AXS-673, another recently approved for AN-C-124.

**RUST VETO**—Many men think of this Houghton brand when considering rust preventives for industrial use, rather than for required "specs." Hence Rust Veto will be the name increasingly applied to Houghton preventives intended for industrial protective applications. There are new Rust Veto products, too—the result of our many years of experience and research in the never-ending fight against rust. Tell the Houghton Man your problem, or write—

### **E. F. HOUGHTON & CO.**

303 W. Lehigh Ave., Phila. 33, Pa.  
Service and Sales in all principal cities

# For RELIABILITY use CLEVELAND'S



● For many years Cleveland Presses have been used by the automotive industry. In this highly systematized field delays are extremely costly. The production line must maintain a smooth flow of parts at all times. It is a testimonial of the highest sort to the Reliability of Cleveland Presses that they are in demand by this great industrial group.

Shown here are a group of five Cleveland Presses in one of the nation's automotive plants. They are used in a parts production line, working around the clock. They were chosen for reliability shown by earlier Cleveland Presses... their ability to stand up under the punishment called for in high speed production.

*For complete information on all models of CLEVELAND PRESSES write for folder 55*

**PUNCHING TOOLS & DIES**

OFFICES AT:  
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DETROIT... PHILADELPHIA  
PITTSBURGH

**THE  
CLEVELAND**  
PUNCH & SHEAR WORKS CO.  
U.S.A.

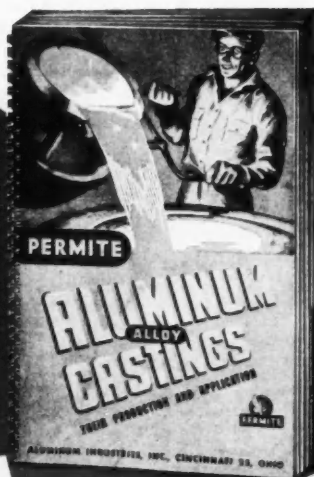
Established 1880

..... POWER PRESSES .....

**FABRICATING TOOLS**

**CLEVELAND 14, OHIO**

Here's help on your  
**ALUMINUM  
CASTINGS  
PROBLEMS**



**VALUABLE NEW  
REFERENCE MANUAL**

**Sent on Request  
to Interested Executives**

**Full of Facts and  
Data You Can Use**

Advantages of Aluminum  
When you should use —

Sand Castings  
Permanent Mold Castings  
Die-Castings

Use of Different Alloys for Desired  
Qualities

Heat Treatment for Added  
Tensile and Yield Strength  
and Hardness

Design Principles  
Quality Control  
Finishing Methods

**E**VERY user or prospective user of aluminum castings will find cost reduction or product improvement ideas — or both — in this new manual on the production, characteristics and uses of aluminum castings. It contains 80 pages of facts and data useful to management and engineering executives interested in product improvement through the use of aluminum castings of the right type and design.

In chapter after chapter it discusses production methods, alloy uses, design principles, and other factors important to obtaining the desired casting quality for each specific end use requirement.

This complete reference data book is offered by the Engineering Department of Aluminum Industries to those manufacturers interested in obtaining the best value in aluminum castings to meet their specific parts requirements. Recommendations and estimates on your castings requirements also submitted upon request. Write us today.



**PERMITE**

**ALUMINUM INDUSTRIES, INC.**

CINCINNATI 25, OHIO

DETROIT: 600 New Center Building, NEW YORK: 7 Broadway, PHOENIX: 100 S. Jackson Street, ATLANTA: 400 Grant Building

ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS



ONE SMALL FACTORY IN 1911



TEN GREAT PLANTS IN 1949

## THE STORAGE BATTERY GREW UP WITH *GLOBE-UNION*

SINCE the days of the "horseless carriage" the name "Globe-Union" has meant quick starting and dependable electric power for automotive vehicles. Just as the horseless carriage owes its development to the great names which are to-

day's leaders in automobile production, so the storage battery, staunch ally of automotive power, has grown up with the great names of battery building. Globe-Union is very proud of its part in storage battery development. Many of the

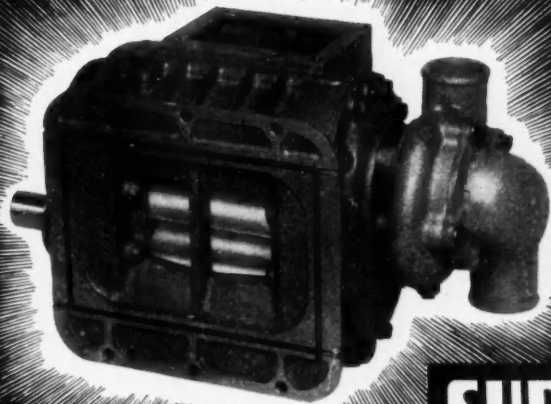
milestones in battery history were also milestones in the progress of Globe-Union . . . the inevitable consequence of the Globe-Union pioneering and research which has helped produce the remarkably efficient storage battery of today.



### **GLOBE-UNION INC.**

MILWAUKEE, WIS.

Atlanta, Ga. • Cincinnati, Ohio • Dallas, Texas • Los Angeles, Cal. • Medford, Mass.  
Memphis, Tenn. • Mineral Ridge, Ohio • Oregon City, Oregon • Philadelphia, Penna.



# SCHWITZER- CUMMINS SUPERCHARGERS

**POSITIVE DISPLACEMENT**  
...Sizes to Supercharge  
Engines 50 H.P. to 500  
H.P. Rating — Pressure  
Ratios 2 to 1 Maximum.

- OIL PUMPS
- WATER PUMPS
- COOLING FANS
- SUPERCHARGERS
- VIBRATION  
DAMPENERS
- AUTOMATIC  
SHAFT SEALS

**T**HIRTY YEARS of intensive work on the varied problems related to the development and manufacture of superchargers for all types of internal combustion engines has developed here at Schwitzer-Cummins Company a unique ability to select the best in type of equipment and the "know how" to apply it for the utmost in compactness, efficiency and reliability. Final unit production cost is our prime consideration at all times.

We shall appreciate the opportunity to study your supercharger requirements, either for a new engine design or to improve present performance. We can place at your disposal qualified technical experience and knowledge of proven and latest developments in this field. Our long service to the industry embraces the designing and building of superchargers and their drives for marine and stationary engines—for buses, trucks and locomotives—for earth movers, power generators, pumping, hoisting, and construction equipment and many specialized uses—gasoline and Diesel, two cycle and four cycle, large and small.

Illustrated here is an unusual combination of supercharger and water pump for a six cylinder, two cycle Diesel with automotive engine type bearings, pressure lubricated from engine oil pump.

Whatever your requirement or application, we feel we have something for it. May we serve your needs?

#### ALL IMPORTANT PARTS

are manufactured in our own plants under direction of our supercharger engineers for full interchangeability and the utmost simplicity on service requirements.

More power and improved performance from your engine with compactness, simplicity and low cost. Manufactured to our design or to suit requirements peculiar to your own.

**SCHWITZER-CUMMINS COMPANY**

1125 MASSACHUSETTS AVENUE • INDIANAPOLIS 7, INDIANA, U.S.A.



# BOOST Your "Batting Average" IN PRODUCTION AND PRECISION

With Kent-Owens Milling Machines in your production line-up... you'll turn out *more work*... with *greater accuracy*... and *lower costs*!

Shop men like the "feel" of these machines. Designed for rapid, easy set-up and operation. They've "plenty on the ball" in practical features, too! Efficient... rugged... dependable—assuring steady output without costly down-time.

In the Kent-Owens Standard line are a wide range of hydraulic and hand operated machines. Let a Kent-Owens engineer recommend machines and tooling best suited to your requirements. Write for details. Kent-Owens Machine Co., Toledo, Ohio.

Call on  
**KENT-OWENS**  
for Milling Machines



No. 2-20 Milling Machine  
Table, 42" x 12"  
Table travel, 20"

## KENT-OWENS REPRESENTATIVES

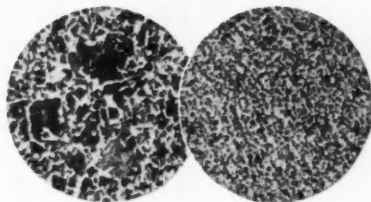
BOSTON General Machinery Corp.	HOUSTON Olivetti Van Horn Co., Inc.	MIAMI John J. Norman Co.	ROCHESTER E. W. Schuler Machinery Co.
CHICAGO Don W. Patterson	INDIANAPOLIS Otero Booth Machinery Co.	MONTREAL E. F. Barber Mach'y Co.	SAN FRANCISCO C. F. Balster Machinery Co.
EL PASO No. 1, Korthmann & Bessell	KANSAS CITY Ballman Machinery Co.	NEW ORLEANS Olivetti Van Horn Co., Inc.	ST. LOUIS Blackman & Spaulding Mach'y Co.
DALLAS Hamilton Foster Mach'y Co.	LOS ANGELES Becker & Gorman Mach'y Co.	NEW YORK Harrington W. L. Brown Company	Union Equipment Company
DAYTON Conger Mach'y Company	MILWAUKEE No. 1, Korthmann & Bessell	PHILADELPHIA Calver Machinery Company	VERMONT J. F. Owens Mach'y Company
DETROIT A. C. Hahn-Kane Mach'y Co.	MINNEAPOLIS The Saxtorff Company	PITTSBURGH Barnes Machinery Company	WILKESVILLE E. F. Barber Mach'y Company
GRAND RAPIDS Joseph Monahan			

**YOU CAN DEPEND ON**

# VANADIUM

**to give you grain size control, high performance, and ease of processing**

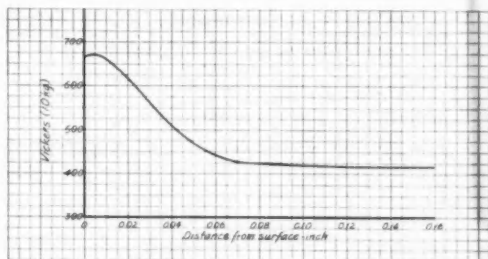
**GRAIN SIZE** is refined by the addition of vanadium, the balance between strength and toughness is improved, and greater uniformity is promoted between transverse and longitudinal properties.



0.34 C

0.34 C, 0.20 V

**HIGH PERFORMANCE** follows the use of vanadium in constructional steels. In carburized parts, for example, the well-integrated bonding between case and core, inherent in vanadium carburizing steels, assures excellent shock-resisting properties and maximum service life.



Hardness penetration graph of Chromium-Vanadium A 6120 steel, with a light case 10.80-0.85% carbon in outer .010 inch.

**EASE OF PROCESSING**—Uniformity of vanadium steels from heat to heat, with easy and uniform response to thermal and mechanical treatments, brings large compensation—savings far over-shadowing differences in initial materials costs.

*Our metallurgists will be glad to assist you in the application of vanadium to meet your requirements.*



MAKERS OF  
FERRO-ALLOYS



CHEMICALS  
AND METALS

## VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

**LOW-ALLOY  
HIGH-TENSILE**

# Mayari R

**...fabricated  
like carbon steel**

Because of the higher properties of Mayari R low-alloy, high-tensile steel some designers assume it is much harder to fabricate than structural steel. Not so.

Experience by many Mayari R users shows that the same equipment and same methods used for forming, punching, shearing and welding ordinary carbon steel usually work well with Mayari R. The only difference is that slight adjustments or allowances may be needed to offset Mayari R's higher properties.

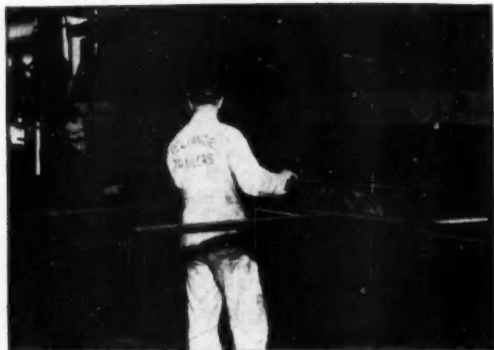
This means that users can take advantage of Mayari R's higher yield point, greater tensile strength, and superior corrosion-resistance in their products without the burden of excessive fabricating costs.

Mayari R is now used in products ranging from buses, trucks and railway cars to tanks, towers and highway bridges. For more information on this versatile steel, its advantages and its applications, write for Mayari R Catalog 209.

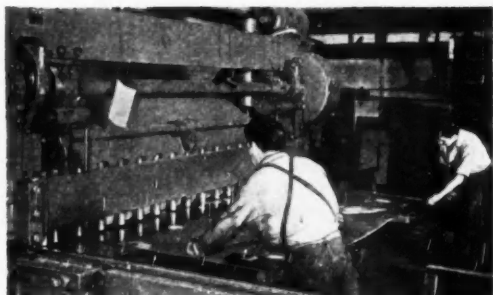
**BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.**

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation



Cold-forming a trailer frame member of Mayari R



Heavy-gage Mayari R being sheared to size



Welding an oil tanker body built of Mayari R

**Mayari R** *makes it lighter...stronger...longer lasting*

# IT'S A **NEW** TOWMOTOR

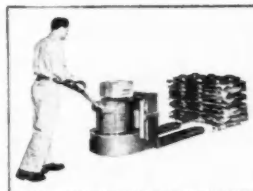
## ELECTRIC HAND-TRUCK

**Moves Loads Faster,  
Easier, Safer!**

PALLET HAND-TRUCK  
MODEL "W"  
Capacity: 4,000 lbs.



Control handle swings on 200° steering arc.



Forks slide easily under palletized load.

**H**ere is the new Towmotor electric pallet hand-truck built to Towmotor's exacting engineering standards. Its compactness, maneuverability and well balanced design make it possible to operate the new Towmotor 25% faster than the average hand truck.\* The steering handle is equipped with twin control buttons conveniently located for either right or left hand operation, which enable the operator to guide the truck from any angle. Other Towmotor Model "W" pallet hand-truck features include rapid hydraulic lift, easily detachable forks, positive traction power, 3-point suspension and differential-action trailer wheels. Write today for full information on this and other models in Towmotor's complete line of Fork Lift Trucks and Tractors.

\*BY ACTUAL TEST WITH RATED LOAD.

### SPECIAL TOWMOTOR

### *Safety Feature!*

Immediately upon releasing the control handle of the Towmotor Model "W" Truck . . .

- . . . the spring equipped, self return automatic turn-off switches cut the power supply to the motor.
- . . . the heavy duty spring returns the handle to vertical position, instantly applying the positive, quick-acting brake to the drive shaft.
- . . . INSURING IMMEDIATE CUT OFF OF POWER AND POSITIVE STOPPING OF THE TRUCK.

**TOWMOTOR CORPORATION**  
DIVISION 45, 1226 E. 152nd ST., CLEVELAND 10, OHIO  
Representatives in All Principal Cities in the United States and Canada

**TOWMOTOR**  
THE ONE-MAN-GANG

**FORK LIFT TRUCKS and TRACTORS**  
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION



Find out how much less it costs

to get an

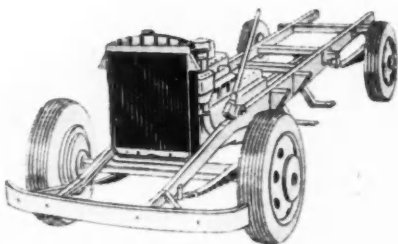
# engineered cooling system

**S**ure, the radiator is the basic unit of any cooling system—for car, truck, bus or tractor. But there's a lot more to be considered.

What a vehicle manufacturer really wants . . . and what he gets when he consults Harrison . . . is an *engineered cooling system* that provides the most effective cooling at the lowest possible price.

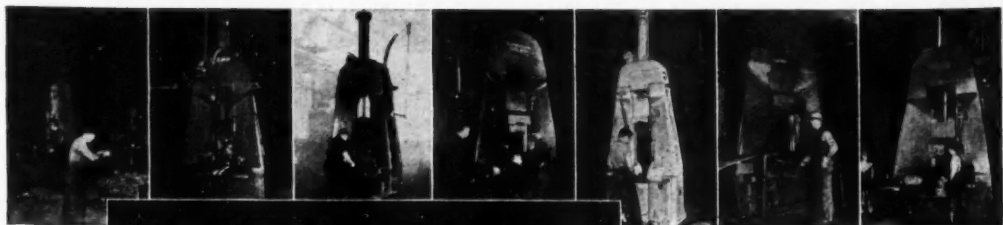
This involves recommendations on such factors as fan location, shrouding of the radiator core, restrictions of air movement, and radiator mounting. The net result is a reduction in core cost, in mounting cost and in assembly cost.

Harrison's Testing Laboratories, engineering know-how, design experience and modern manufacturing facilities assure you an *engineered cooling system* with the most efficient and economical radiator. Harrison Radiator, Division of General Motors, Lockport, New York.

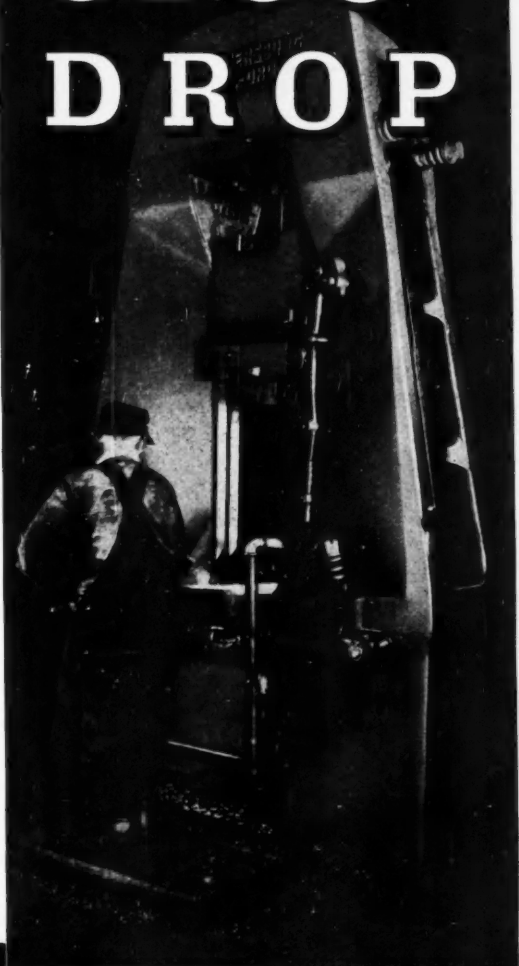


## *HARRISON*

**RADIATORS, OIL COOLERS, THERMOSTATS,  
HEATERS, DEFROSTERS**



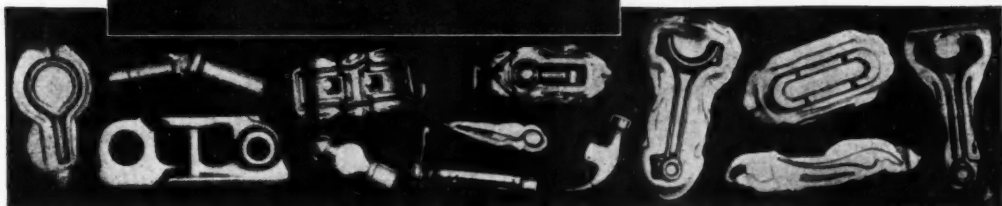
# CECO- DROP



THE *New*  
PISTON LIFT  
GRAVITY DROP  
HAMMER

**The CECO-DROP  
forges more  
minutes per  
hour, makes  
more forgings  
with fewer  
blows, is safer  
and easier to  
operate, costs  
less to operate.**

CHAMBERSBURG ENGINEERING CO.  
Chambersburg Penna.



# Quick picture of slow-wearing links

**P**ICTURES at right show one of the main reasons why Morse Timing Chain Drives have been specified and used on more than 31 million American cars.

Down through the years Morse engineers have improved timing chain in many ways. They have reduced wear, increased speed, traction and toughness; and adapted Morse Timing Chain Drives to fit the needs of the individual auto maker.

**Fig. 1** shows the Morse pin link and clearance link before assembly.

**Fig. 2** shows the links assembled in a straight-line position. The pin is pressed into the pin link and movement takes place only in the clearance link.

**Fig. 3** illustrates how the clearance link moves relative to the pin while the pin remains in the pin link. This action limits possible elongation to one link.

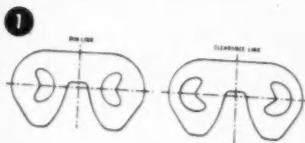
**Fig. 4** shows how the ends of the apertures are used to restrict the motion of the links beyond that which is useful in wrapping the sprockets. In addition, this same feature is used to restrict the flexing of the chain in the reverse direction, as shown in Fig. 2. This "no-back bend" is necessary to minimize chain whip and vibration.

Do you have a problem concerning:

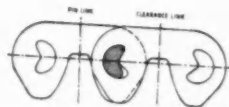
1. Sprocket-tooth combination
2. Guide position
3. Chain width
4. Lubrication Methods
5. Placement and size of sprocket reliefs
6. Sprocket material selection

If so, call or write Dept. 351. Our engineering staff includes men assigned exclusively to the automotive field.

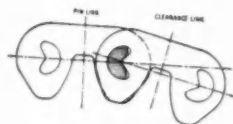
Morse Chain Company, 7601 Central Ave., Detroit 8, Michigan. Phone TE 4-2000.



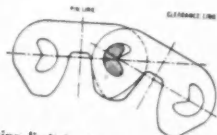
1. Pin link and clearance link before assembly.



2. Pins are held firmly in one row of links while clearance is allowed in other row.



3. Clearance link action on pin as chain flexes.



4. Flexing limit is due to this special construction.



Roller Chain Drives



Roller Chain Couplings



Silent Chain Drives

**MORSE**  
MECHANICAL  
POWER TRANSMISSION  
PRODUCTS



Free Wheeling Clutches

MORSE CHAIN COMPANY • DETROIT 8, MICHIGAN

*Jobs that demand  
precision—*



## **—they're the jobs for DEWARD Oil-Hardening Tool Steel**

**For Complete Data,  
write for the  
DEWARD BLUE SHEET**

Contains full information, certified as laboratory tested and proved, on the physical properties and characteristics of DEWARD Tool Steel, and best methods of handling and treatment. *Send for your copy.*

**ADDRESS DEPT. AI-75**

Wherever your specifications call for hardened machine parts in precision work, you'll gain greatest advantage by using DEWARD Oil-Hardening Tool Steel—famous for its freedom from distortion after heat treatment.

This quality caused the selection of DEWARD for the complete set of precision gears illustrated above, which must run absolutely true in operation. After grinding, the gears are heat treated at 1425-1500° F., oil-quenched and then drawn at 750° F., resulting in a hardness of 48-51 Rockwell C. With no distortion, the final regrind and lapping of the bolt before assembly becomes a simple, quick, low-cost operation.

For any jobs of this general nature, let us show you how DEWARD can save you time and money in produc-

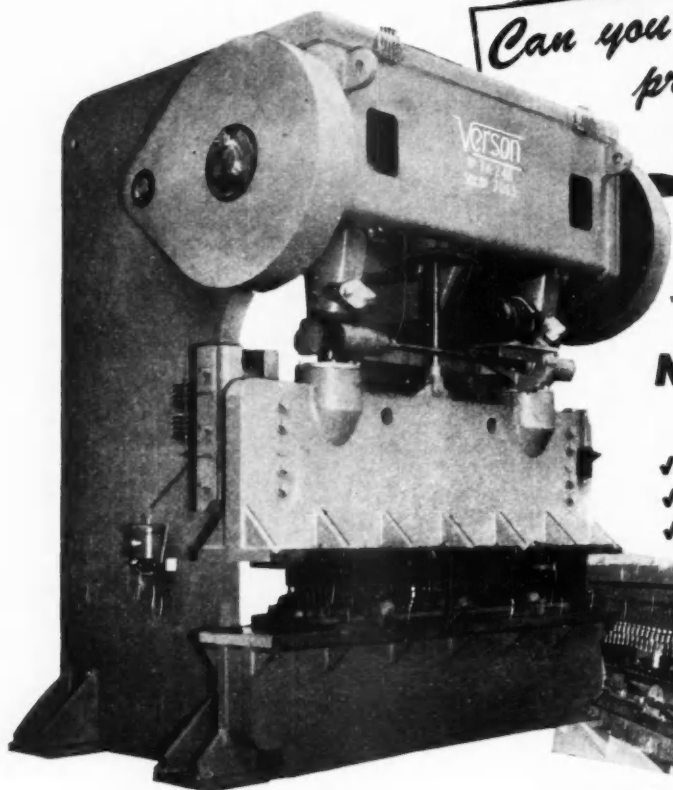
tion, give you a better finished job—or both! Our Mill Service Staff is at your command, without obligation.

**ALLEGHENY  
STEEL CORPORATION**  
Pittsburgh, Pa.

**TOOL STEEL DIVISION: DUNKIRK, N. Y.**

*Fine Tool Steels  
Since 1854*

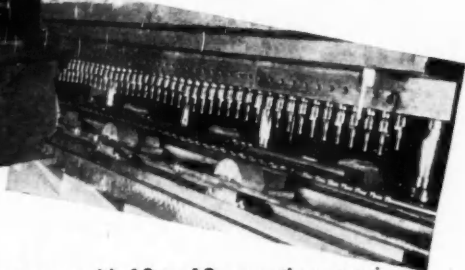




*Can you match these  
production  
figures?*

THIS  
**Verson**  
MAJOR PRESS  
BRAKE

- ✓ Punches 91 holes in 1 handling
- ✓ Reduces punching operations 60%
- ✓ Cuts production time by  $\frac{2}{3}$



Designed and built for gang punching operations, the Verson Major Press Brake illustrated above has made possible tremendous savings in time and material handling for a manufacturer of harvesting combines and allied equipment. The part produced in this machine is an 8' 4" long angle bar 2" x 2",  $\frac{3}{8}$ " thick which requires 91  $\frac{3}{8}$ " holes. With the aid of air cylinders to straighten and clamp the piece (see close-up of die above) the Verson Brake punches all 91 holes in one handling. This

compares with 10 to 12 operations previously required . . . time per piece is cut to  $\frac{1}{3}$  of previous requirements.

And this is not an isolated case, either — it is typical of how scores of manufacturers using modern equipment and materials, engineered by Verson, have slashed production costs. Whatever your metal forming or punching problem we'd like the opportunity to show you how Verson can speed your production and cut costs. *Write today!*



## VERSON ALLSTEEL PRESS COMPANY

9307 South Kenwood Avenue, Chicago 19, Illinois

Holmes Street and Ledbetter Drive, Dallas 8, Texas

A Verson Press for every job from 60 tons up!

BLANKING PRESSES

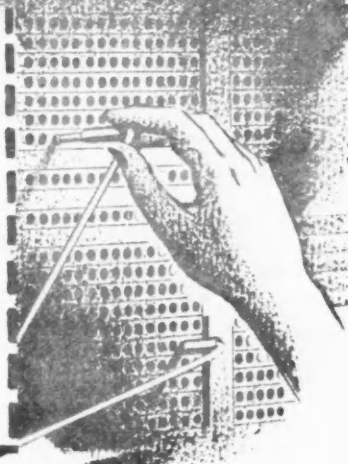
FORGING PRESSES  
PRESS BRAKES

DIES

DRAWING PRESSES  
DIE CUSHIONS

HYDRAULIC PRESSES

## A Special Message of unusual importance to 2600 Plant- Operating Heads



### YOU'LL WANT THE FACTS

on this field-tested "**TRIPLE C**" Plan, if production machining is a factor in your operation

**You'll find** Carboloy's new plan of Coordinated Carbide Control ("Triple C") of real importance to your company's "break-even" position on expenses versus income.

It produces savings that go far beyond mere economies in initial tool cost—savings that are of unusual significance in the manufacturing cost of your product.

#### Plant-wide benefits that add up BIG

Are you vitally concerned over a high "break-even" point? "Triple C" has been *specifically developed* to help you lower it by:

- reducing manufacturing costs
- increasing production
- eliminating waste of time and materials

The "Triple C" Plan is a quick and positive way to help effect the kind of major savings that *interest you most* in these days of high fixed and variable costs.

**It is a plan** for *coordinating all phases* of carbide tool use in your plant. Years of field experience—under actual working conditions in *manufacturing plants*—went into its development.

#### Proof that "Triple C" is effective

Wherever it has been used, the plan has brought outstanding results . . . without increase in man-hours, without plant expansion, and without added major capital expenditure!

"Triple C" has worked wonders for other companies. It can probably be just as sensational a performer for your business.

#### Here is a typical case

"With fewer machine tools in operation, production was more than doubled, but cost per piece was not increased, despite a raise of 15.7% in hourly labor rate and a substantial increase in material cost."

—Midwest manufacturer—  
(Name on request)

**CARBOLOY COMPANY, INC.**  
11151 E. 8 Mile Blvd., Detroit 32, Michigan

**CARBOLOY®**  
CEMENTED CARBIDE



FOR EVEN GREATER  
SAVINGS WITH CARBIDES

# built-in DEPENDABILITY

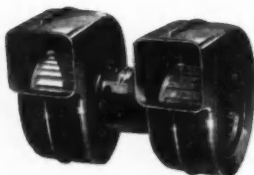


This direct current blower unit delivers up to 125 cubic feet per minute.

## Redmond MICROMOTOR BLOWER UNITS



• MODEL 3866 A.C.  
150 C.F.M.



MODEL 3901 A.C.  
220 C.F.M.



MODEL 3744 A.C.  
100 C.F.M.

Here's the solution to your small-blower problems . . . choose a Redmond Micromotor Blower Unit. Compact, sturdy, and thoroughly dependable, these units are built to give long-lasting satisfaction. Precision balancing of all moving parts minimizes vibration, assures quiet operation.

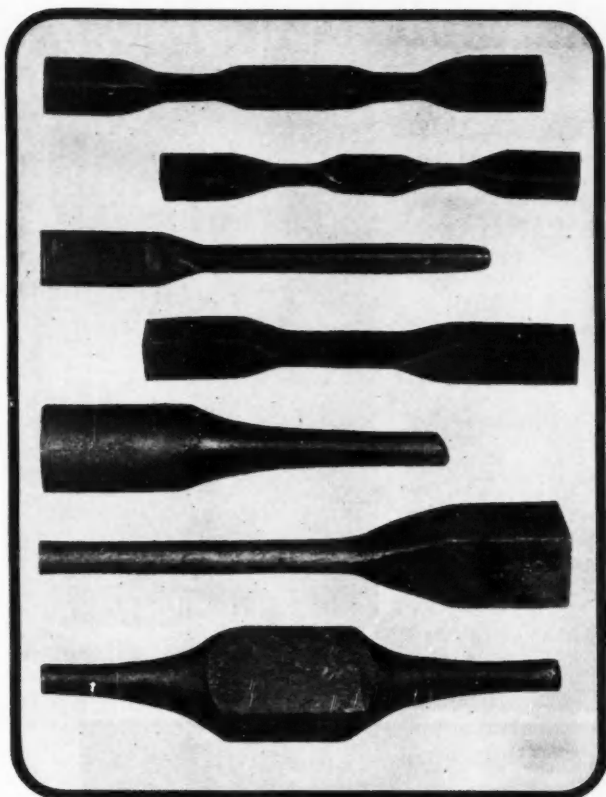
Each unit is powered with a Redmond Micromotor, famous for its ability to perform smoothly and quietly over thousands of hours of continuous duty.

D. C. blowers available in capacities up to 125 C. F. M.; A. C. blowers up to 220 C. F. M. Single or double outlet. Outlet mounting flanges and inlet screens also available. Write for catalog.

**Redmond** COMPANY, INC.  
OWOSSO, MICHIGAN

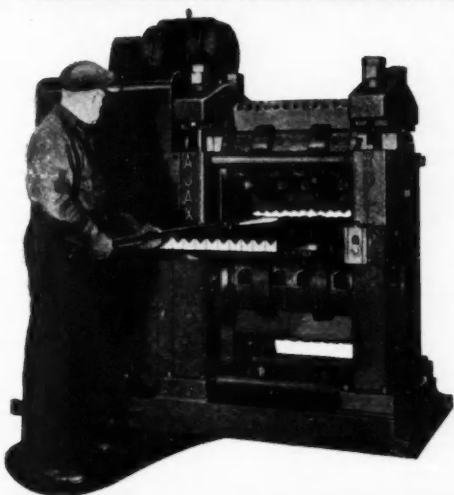
OFFICES IN NEW YORK, CHICAGO, DAYTON, LOS ANGELES, DALLAS  
Expanded Facilities • Prompt Deliveries • Service before and beyond the sale





# **A J A X R O L L S**

For all sizes  
and types of  
**F O R G I N G  
B L A N K S**



Available in six sizes, AJAX Wide Adjustment Forging Rolls have capacities for pre-rolling forging blanks ranging from the smallest automobile valve rocker arm to the largest airplane propeller. And backing these, AJAX engineers have a priceless wealth of experience in design of roll grooves and pre-rolled forging blanks acquired during the more than fifty years since AJAX introduced these Rolls into the forge shop.

Die width to accommodate the considerable series of grooves required for abnormally great, cross-sectional reductions or several groups of grooves for blanks with different metal distribution, gives these machines wide general utility.

The advantages accruing in the press forging or drop forging of accurately proportioned, pre-rolled blanks through metal saving, longer die life, greater output and stronger forgings warrant your investigation.

*WRITE FOR AJAX BULLETIN 91-A  
And Additional Information*

**THE AJAX** MANUFACTURING COMPANY  
EUCLED BRANCH P. O. CLEVELAND 17, OHIO  
110 S. DEARBORN ST. DEWART BUILDING  
CHICAGO 3, ILLINOIS NEW LONDON, CONN.

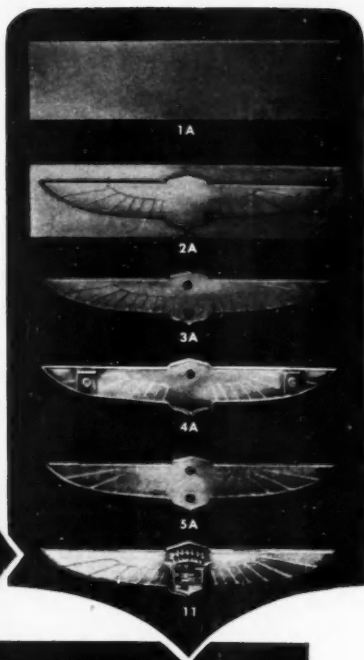
# How the base metal protects the finish

Progressive steps in the production of this emblem in red, white, blue, black and gold vitreous enamel and heavy gold plate, as made by American Emblem Company, Utica, N. Y.



(1) The metal is blanked from sheet stock. (2) First coining operation. (3) Second coining operation. (4) The excess metal is trimmed. (5) Attaching devices are welded. (6) First vitreous enamel charge has been fused by firing. (7) Second vitreous enamel charge has been fused by firing. (8) The enamel colors are stoned smooth. (9) Enamel has been given a final fusing and buffing. (10) The plate is electro gold plated.

(1A) The metal is blanked from sheet stock. (2A) The design is coined. (3A) The excess metal is trimmed and holes pierced. (4A) Attaching studs are welded. (5A) The plate is buffed and chrome plated. (11) The two pieces are assembled. (12) Finished plate as passed by inspectors.



*This is a typical example of a fine emblem, combining good design, excellent materials, and a high degree of art and craftsmanship in production.*

It is almost always the case, though unsuspected by the general public, that the material to which a finish is applied has a definite influence upon the perfection and durability of that finish. For example, products that are nickel or chromium plated stand up better if the base metal is non-rusting, as is copper and brass. To take another example, look at vitreous-enameled emblems, used as trademarks, name plates, medals, lapel pins, insignia, and so on. Most of these emblems have a copper alloy as the base metal; only that, or gold or silver, can be used.

These emblems owe their beautiful

and permanent colors to silicate pastes and powders, inlaid by skilled artisans, and twice fused in a furnace at a temperature of about 1500° F. This temperature sets high standards for the underlying metal which must not warp, nor "bubble up" into the enamel. Thus visible beauty for which so much creative skill is required, depends in part on the invisible metal underneath. Revere, which takes great pains to maintain the strict standards of its alloys, is proud to meet the high requirements of American Emblem and other companies in this field . . . Perhaps Revere can help you by supplying exactly what you require to protect

the finish and durability of your product.

## REVERE

**COPPER AND BRASS INCORPORATED**

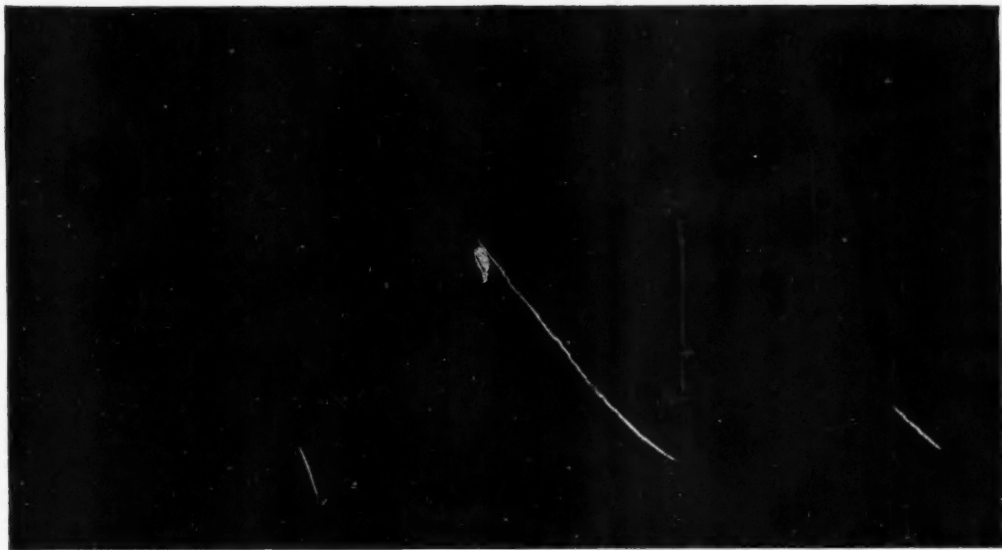
*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.

*Sales Offices in Principal Cities, Distributors Everywhere.*



*Defects in Connecting Rod Forgings shown under Black Light*

## **Fast, Accurate Inspection Plus Doubled Savings!**

These are the immediate results achieved by one of the major automotive plants using Magnaglo\* for inspection of connecting rod forgings. Here's the complete story:

**FORMERLY**—Connecting rod forgings were cleaned by pickling, then visually inspected. Cost per thousand was \$7.50 for cleaning and inspection.

**TODAY**—Forgings are cleaned by shot blasting, then inspected with Magnaglo under black light, using less man hours with semi-automatic Magnaflux production units. Cost is now \$6 per thousand.

Faster inspection at lower cost . . . yes; and still more important is the far greater accuracy of Magnaglo. With visual inspection this plant saved \$100 per day in machining time by eliminating defective forgings in the rough state. With Magnaglo, savings are \$200 per day because twice as many defective forgings are spotted *before* machining.

Production officials of this plant give full approval to Magnaflux for improved quality control at production line speed that really "pays off". Magnaflux non-destructive inspection can achieve similar savings for you—write today for full particulars.



\* Magnaflux, Magnaglo, trademarks of Magnaflux Corporation applied to equipment and materials for use with magnetic particle and fluorescent magnetic particle inspection methods.

**M A G N A F L U X   C O R P O R A T I O N**

3904 Northwest Highway, Chicago 33, Illinois

**NEW YORK   •   DALLAS   •   DETROIT   •   CLEVELAND   •   LOS ANGELES**

Export Distributor: Curtis Wright Corp.   •   In Canada: Williams and Wilson, Ltd.

## Where in the Thunderjets are DISSTON Aircraft Steels?



"Disston Aircraft Steels are used so extensively in the manufacture of this plane that . . . a picture of the completed airplane would be best."

—REPUBLIC AVIATION CORPORATION

Uncle Sam salutes Republic Aviation for developing and mass-producing Thunderjet fighters. His pleased look takes in Disston, too. For Disston Aircraft Quality Steels are "showing their stuff" in many crucial parts of this great jet plane. It is capable of speeds up to 600 mph—proof enough that steel specifications are rigorous, and that Disston Steels qualify.

Widely used in both the military and civilian fields, such Disston Aircraft Steels as AISI 4140—4130—4340—have earned complete respect. Produced in Disston electric furnaces, to live up to Disston

Magnaflux quality standards, these steels rate consistently high under test. Yield strength and tensile strength fulfill strictest requirements. Elastic limit, elongation and reduction of area can be certified without qualification. Tests for grain size and hardness; also deep etch further prove the extreme uniformity of Disston Aircraft Quality Steels.

Rounds, squares, flats and hexagons of desired dimensions are obtainable. Or you may have special needs. Skilled Disston metallurgists know how to satisfy you . . . *with exactness.*

### HENRY DISSTON & SONS, INC.

531 Tacony, Philadelphia 35, Pa., U. S. A.



# NATIONAL OIL SEAL LOGBOOK

## PRACTICAL USE OF DUAL-WIPE LEATHER OIL SEALS

Heavy duty mechanisms operating under extreme dust and dirt conditions require two-fold protection of bearings and gears. Operating lubricant or fluids must be retained; harmful abrasives must be excluded from bearings and gear boxes. Many designers are answering this problem by specifying dual-wipe seals.

Typical of such seals are the National 10,000 and 30,000 Series oil seals. The 10,000 series (Fig. 1) is designed for moderate external dust conditions, speeds up to 2,000 F.P.M., and temperatures not exceeding 200°F. The 30,000 Series (Fig. 2) is designed for heavier abrasive conditions, speeds to 2,000 F.P.M., and temperatures not over 200°F.

Auxiliaries of felt are generally recommended for higher shaft speeds than are auxiliaries of leather.

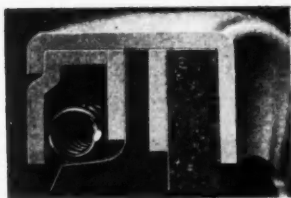


Figure 1

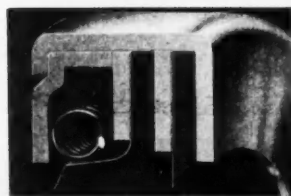
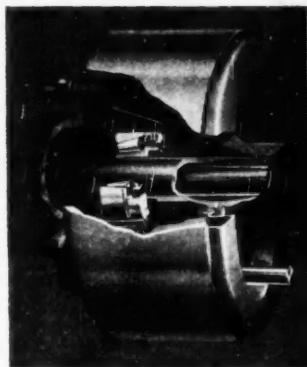
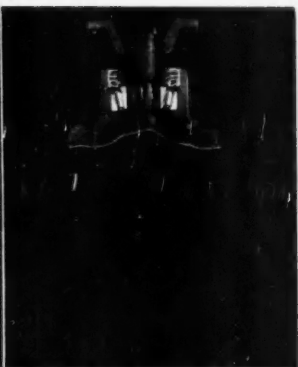


Figure 2



Oil Seal, Rear Wheel



Oil Seal, Pinion

Figure 3

Both seal types are used in the heavy truck pinion and axle in Figure 3.

At the pinion, the problem was to retain lubricant, while excluding fine dust and grit from the mechanisms. A double-wipe seal was indicated, yet it had to be a seal whose exterior member could run "dry," at speeds up to 3,000 RPM. The National 10,000 Series seal answered the problem. Its spring-loaded inner sealing member, running under a pressure head of lube,

maintains an effective seal despite high speed. The felt auxiliary effectively keeps out abrasive dust.

At the wheel position, the problem was to retain lubricant within the hub while excluding dirt churned up by the drive wheels. Since speeds were low and the main sealing member could operate under well lubricated conditions, a National 30,000 Series seal proved effective. The spring-loaded main member retains wheel lube, while the dry-running

leather flange keeps out abrasives.

Oil seals such as these two National types are generally preferred for applications where speeds are low, such as trucks over 1½ tons, tractors, farm implements and road equipment. When speeds and temperatures beyond those discussed are encountered, synthetic seals will solve the problem. When extreme conditions exist, a special design may be necessary.

For additional information about dual-wipe seals in your product, ask the nearest National Oil Seal Engineer or write direct.

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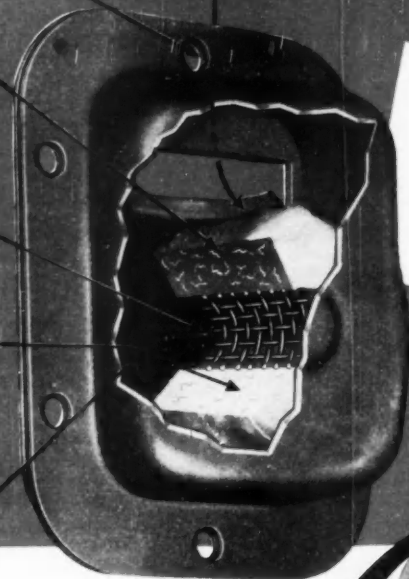
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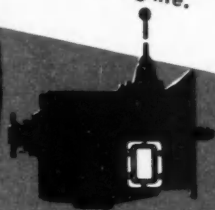
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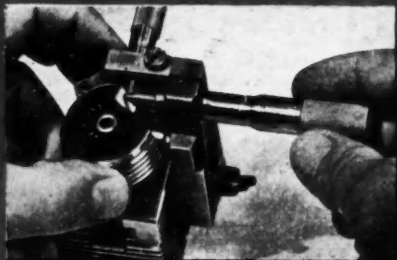
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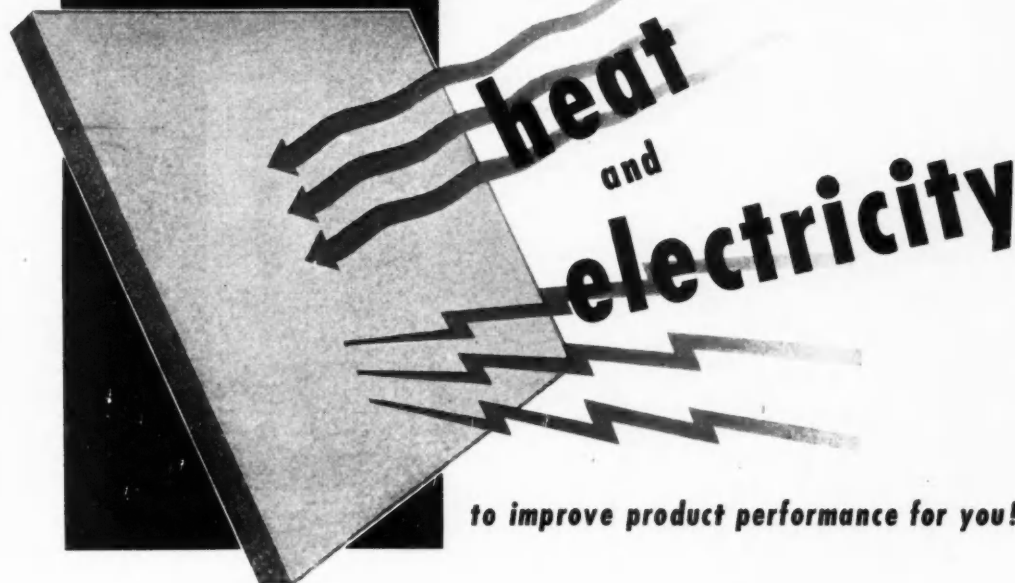
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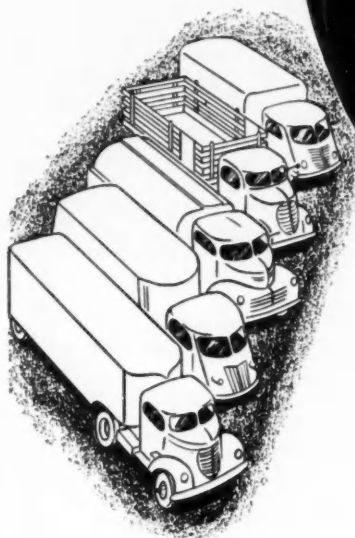
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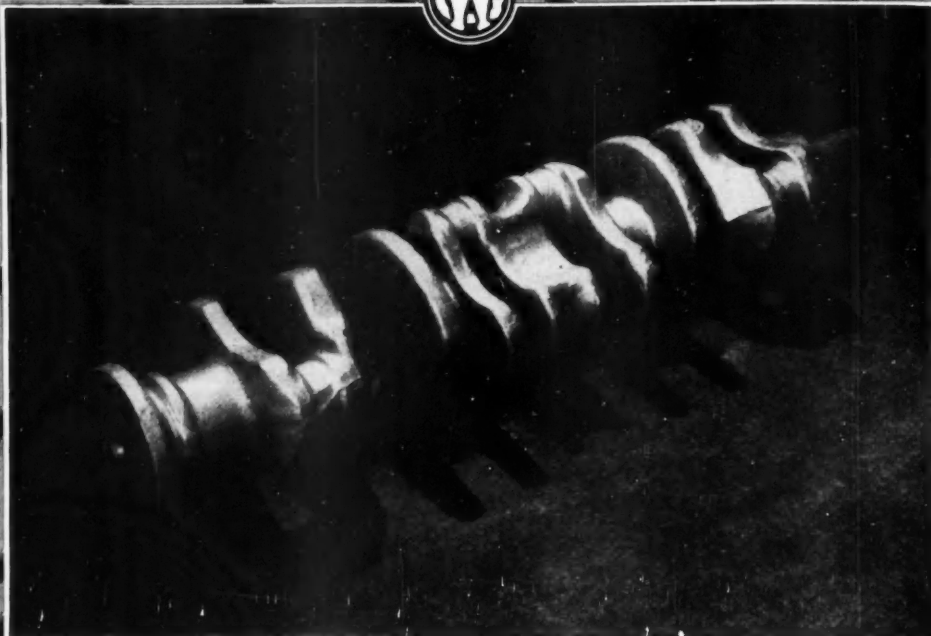
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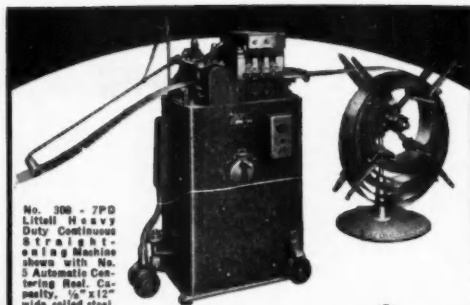
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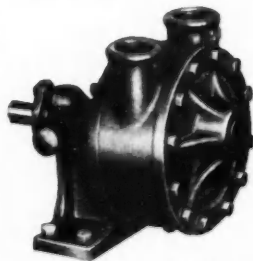
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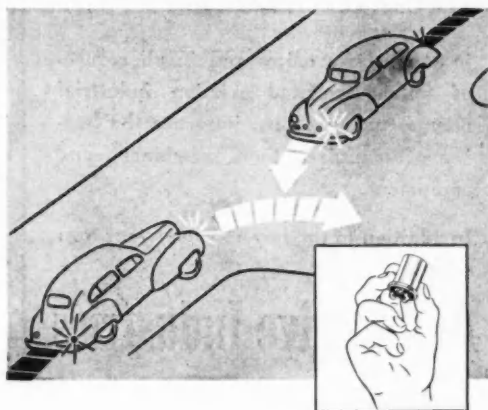
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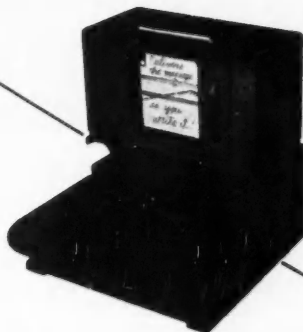
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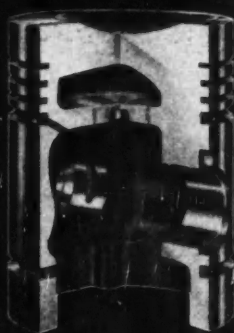
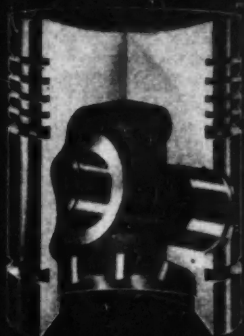
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FOR UNIFORMITY, QUALITY, AND STAYING POWER



**Everlock**

SCREW-WASHER  
ASSEMBLIES



FEATURING THE FAMOUS

**Everlock**

"CHISEL-EDGE" LOCK WASHER

**Everlock** Screw-Washer Assemblies are engineered and manufactured to insure that unvarying uniformity so vital to quick, low-cost assembly . . . and dependable performance under all conditions. Precision is the **Everlock** watchword through selection and inspection of steel, control of dies, heat treating and final inspection.

There is a precision-built **Everlock** Screw-Washer Assembly for every need. All types provide the unmatched staying power of non-removable **Everlock** Lock Washers' wide chisel edges. Other important advantages include simplified ordering and stocking, automatic assurance that lock washers are applied where needed for positive resistance to every hazard of vibration, expansion, contraction and strain.

WRITE FOR PARTICULARS

THOMPSON-BREMER & COMPANY, 1642 W. HUBBARD ST., CHICAGO 22, ILL.

THERE'S AN

**Everlock**

LOCK WASHER  
FOR EVERY NEED

the washer that has the edge



Standard  
External Everlock



Standard  
Internal Everlock

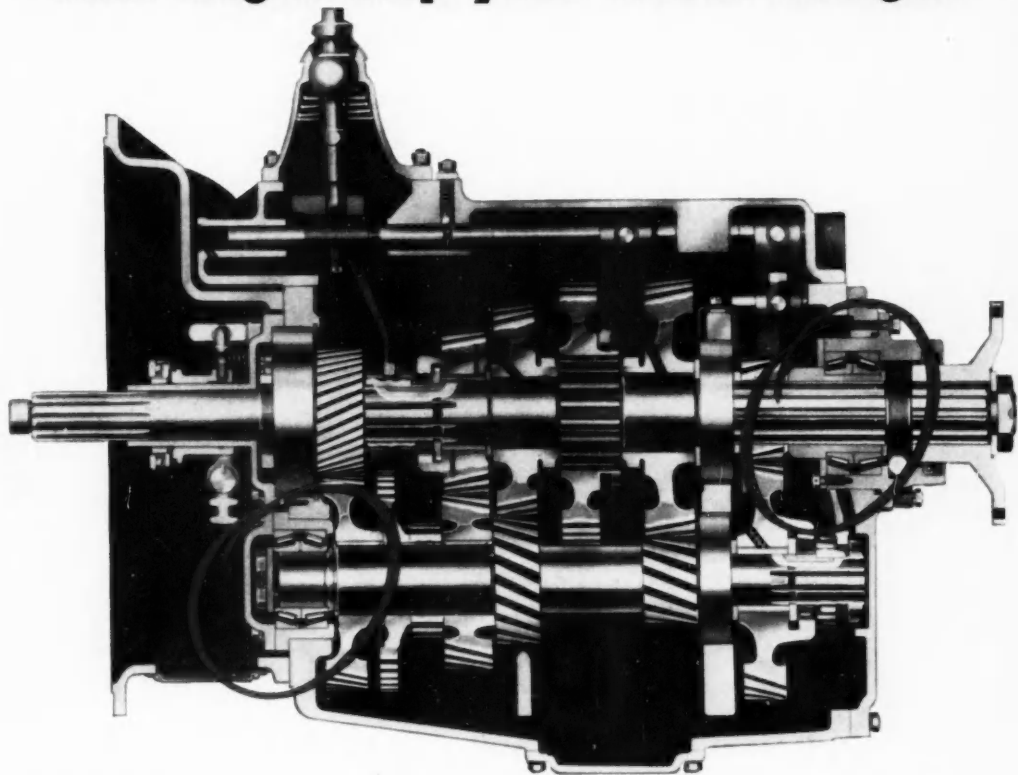


Standard  
80° Countersunk Everlock



Standard  
Internal-External Everlock

# What does this Fuller transmission have that might help your secret design?

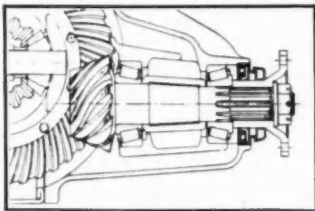


If you're working on a secret new transmission, may be there's a helpful idea in this heavy duty job designed by Fuller for huge, high-torque truck engines. To assure long transmission life, easy shifting and smooth operation, The Fuller Manufacturing Company uses Timken® tapered roller bearings at critical points on both main and countershafts.

What's the point for you?

Just this—no matter how you plan to convert power, Timken bearings will assure longer life and smoother, quieter operation under the toughest conditions!

Because Timken bearings carry both radial and thrust loads, special thrust bearings aren't needed. Space is saved. Line contact between rolls and races holds shafts rigid. Shaft deflection and end-movement are reduced. Gears mesh smoothly. And since Timken bearings can be taken up during assembly, tolerances on



All but 2 cars use Timken bearings on the pinion. Here's a typical application.

surrounding parts can be greater, designs simplified.

For further proof of what Timken bearings can do for transmissions,

look at pinions. Recently two more car manufacturers switched to Timken bearings and today all but two makes of passenger cars use Timken bearings for this important job!

The trend is to Timken for all tough bearing applications. For assistance with your problems, feel free to use our complete engineering facilities. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

**NOTE TO P. A.'S.** Because every step of the manufacture of Timken bearings is controlled within our company... because our vast manufacturing facilities are widely dispersed... you will find The Timken Roller Bearing Company a supply source of outstanding reliability.

## TIMKEN

TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION